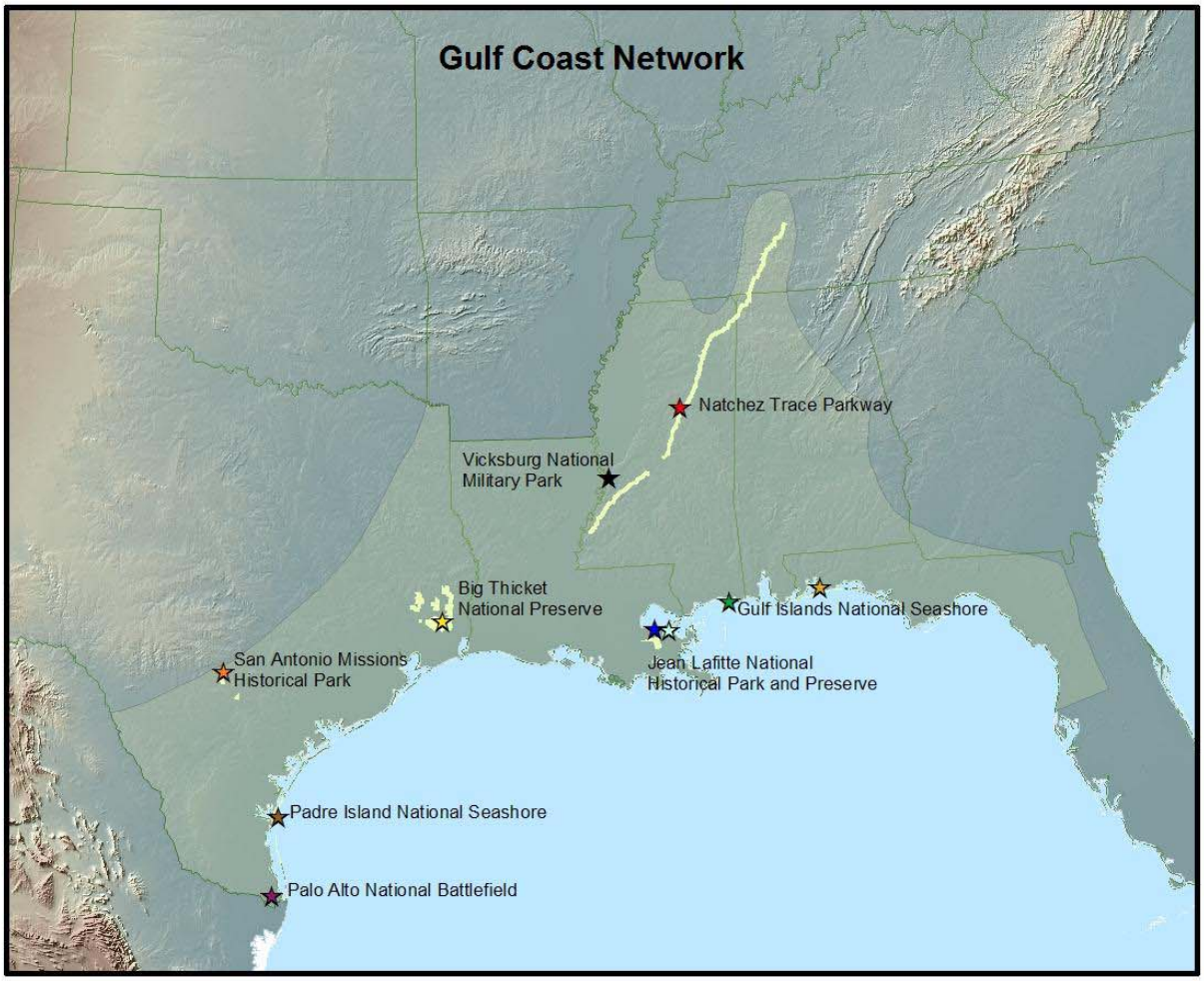
Natural Resource Summary for
Gulf Islands National Seashore (GUIS)

FINAL REPORT

February 2005



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EXECUTIVE SUMMARY

The National Park Service's (NPS) Gulf Islands National Seashore (GUIS) consists of several units in both Florida and Mississippi. The Mississippi section of Gulf Islands National Seashore (GUIS-MS) consists of five islands and a small mainland headquarters. From the west to east, the islands of GUIS-MS are: Cat, West Ship, East Ship, Horn, and Petit Bois Islands. East and West Ship are separated by a small pass and are occasionally referred to singly as Ship Island. Horn Island is the largest and Cat the most recently acquired of the GUIS-MS islands. Davis Bayou is the only mainland area in the GUIS-MS park section. Dauphin Island, AL to the east, although not within the park, is somewhat geographically contiguous with the GUIS-MS islands. Together, these islands form part of the southern boundary of Mississippi Sound. The Florida section (GUIS-FL) consists of portions of two islands and two small mainland areas. The western island is Perdido Key; the eastern section of which is in the national seashore. The easternmost island of GUIS-FL is Santa Rosa Island. Three park units are located on Santa Rosa Island, Fort Pickens, Santa Rosa Area, and Okaloosa Area. To the north of Pensacola Bay is Fort Barrancas, an area of GUIS-FL that has received little study. The Naval Live Oaks Reservation is on a peninsula forming part of the eastern mouth of Pensacola Bay. Unlike the GUIS-MS, all the areas of GUIS-FL, including the islands, are accessible to vehicles. The waterbodies surrounding GUIS-FL include Santa Rosa Sound, Big Lagoon, Pensacola Bay, Choctawhatchee Bay, and the Gulf of Mexico.

The biological communities of GUIS have been extensively studied. Predictably, much of the study has focused on coastal, marine, estuarine, and insular island communities. The park is home to a number of threatened and endangered species. Although scientific research has been conducted in the area since the early and mid 19th century, most effort has occurred since the 1950s.

The terrestrial and aquatic vegetation of GUIS has been extensively studied. Many of the terrestrial studies have focused on general plant ecology and dynamics while relatively few treat specific species. Species-specific research has been more common for aquatic plants due to the substantial effort directed toward seagrasses. However, many of the aquatic plant studies have also focused on general ecology and community structure. A variety of general surveys have been conducted of the terrestrial plants on all of GUIS-MS and most of GUIS-FL. According to the NPSpecies database, 875 vascular plant species have been reported on GUIS although 193 species have not been confirmed. New vascular plant inventories of the park are planned for the near future. Many of the aquatic vegetation studies have focused on understanding seagrass bed health and the effects of various disturbances. A short-term study of seagrass beds indicated that turtle grass and shoal grass populations were healthy in the GUIS-MS areas sampled while GUIS-FL sites showed decline. Currently there is no turtle grass on GUIS-MS. Manatee grass populations were in decline generally, having disappeared from the GUIS-MS sampling sites. Algal populations have also been studied in conjunction with seagrasses. These studies have identified those species that occur in conjunction with particular seagrasses as well as focused on algae ecology and distribution. Some studies on GUIS-FL during the 1990's showed an increased growth in algal populations due to cultural eutrophication could cause problems for this area.

Much of the mammal research conducted at GUIS has focused on several species of concern. Several subspecies of beach mice, including the endangered Perdido Key beach mouse, are found in the park and have been studied regularly since the 1950s. Efforts have been made to reintroduce and monitor the endangered Perdido Key beach mouse to Perdido Key. One study found that the Perdido Key beach mice would likely go extinct unless habitat fragmentation was reversed. During the last 15 years, another endangered species, the red wolf, has been raised on Horn Island for release at suitable inland sites, most notably Smokey Mountain National Park. Trapping, telemetry, and diet analysis have been used to study wolf behavior at the park. Feral hogs are no longer present in the park but were previously studied on GUIS-MS to examine their effects on vegetation. Multiple studies found their effect was not as severe as was previously thought. Several surveys of GUIS mammals have been conducted that have focused mostly on the barrier islands of GUIS-MS. Eighty species have been listed within the park on NPSpecies although over half of them are unconfirmed. A recent survey that focused on the bat species of GUIS has been conducted by University of Southern Mississippi and should be concluded in 2004. Studies have also examined the effect of foraging of mammals on the park's vegetation and found that although it slows the recovery of the vegetation it did not displace any plant species.

A number of herpetological surveys have been conducted on GUIS in the past including an inventory in the mid-1990's and one that is currently being conducted. These surveys and other studies have found 47 species of amphibians and 98 species of reptiles, although over 40 percent have not been confirmed. Marine turtles nest yearly on the GUIS beaches. All four species found in the park and surrounding waters, including loggerhead, green, leatherback, and Kemp's Ridley, are threatened or endangered. Numerous surveys and reports have documented their nesting activities in the park. Aside from the general herpetological surveys, there have been no studies on GUIS that focused entirely on amphibians.

A relatively large amount of research has been conducted on the birds of GUIS. The park and surrounding area provide year-long or temporary habitat for several Federal species of concern including Piping Plovers, Bald Eagles, and Red-cockaded Woodpeckers. The islands of GUIS provide habitat to a variety of shorebirds. Additionally they are important stopover points for songbirds migrating across the Gulf of Mexico and significant research has been directed toward understanding habitat use and biology of these migratory species. Much of this work was conducted by Frank Moore and his colleagues on East Ship and Horn islands and focused on migration ecology, habitat use, and food availability. Over 280 species of birds have been documented on GUIS.

Fish have been studied in a variety of habitats in and around GUIS. Most of this research has been ecological in nature, examining the habitats, behavior, and interactions of fish communities. The waters off the coast of Horn Island and in the Mississippi Sound have been sites of a large portion of this research. Those few studies conducted inland occurred mostly in the freshwater lakes on Horn Island. Although there have been no large scale fish surveys conducted by GUIS, over 200 species of fish have been documented in the waters on and around GUIS. One Federally Threatened species, the Gulf sturgeon, likely present in the park.

Invertebrates have been extensively studied in the park with much of the research focused on aquatic macroinvertebrates. Much of this information has been gained incidentally through other studies. Many of these studies examined the species assemblages and environmental factors effecting benthic invertebrates, crustaceans, and mollusks. Research on mollusks, oysters in particular, has been focused on the suitability of habitat and productivity of the surrounding waters. The effect of beach nourishment on macroinvertebrates has also been the focus of some study. General findings suggest that the recovery rate, species diversity, distribution, and community composition were adversely affected. The limited research performed on terrestrial invertebrates of GUIS has focused generally on the flying insects on the GUIS-MS barrier islands and spiders and hymenoptera on GUIS-FL. Two hundred and fifty-four species, including both terrestrial and aquatic, have been documented within GUIS.

The northern Gulf of Mexico region that contains GUIS is geologically dynamic and has been the focus of much research. This research has examined natural, long-term geophysical changes and sudden changes caused by storms and human actions but because the MS and the FL sections of GUIS are geographically distinct and their geomorphology has been studied separately. Changes in the geomorphology of the islands were examined through a variety of techniques including comparative field surveys, vegetation surveys, comparison of maps and aerial photographs, LIDAR, Global Positioning Systems surveys, cross-shore profiles, sediment cores, and bathymetry. Investigations in both portions of the park have shown a great loss of sediment due to erosion. The amount lost was impacted by both natural and human events. During an investigation on GUIS-MS of sand resources available for beach nourishment on West Ship Island, one study concluded that more than 640 acres had been lost to erosion since the 1850s. The erosion was worst on the south shore of the island and was negatively impacted by piles of rock and concrete around the Ship Island Lighthouse. Some reports suggest the eventual extirpation of islands such as Petit Bois. In Florida, using data concerning beach nourishment projects from the 1980's and several hurricanes, researchers found that the amount, distribution, and elevation of beach material greatly influence shoreline movements on the Gulf side of Perdido Key. During a more recent study of the beach profile changes on the north shore of Santa Rosa Island, research found that southerly and easterly wind currents heavily impacted beach movement by increasing tide water levels. Northerly and westerly winds were found to decrease tide effects in the Pensacola Bay area.

There has been relatively little study directed toward mineral and soil science for GUIS. Some of the significant work has been in areas adjacent to the park. The U.S. Department of Agriculture, Soil Conservation Service has conducted soil surveys of some of the counties containing GUIS, including Jackson, MS; Harrison, MS; Santa Rosa, FL. Reports describe soil types, show their locations, and discuss their response to physical forces. There are various other surveys on the heavy minerals of some areas of the park including the Mississippi Sound, Horn and Ship Islands, and Fort Pickens.

Most of the hydrology research for GUIS has concerned the surface water of the park and surrounding areas. The sounds, bays, ponds, and lagoons of the park have all received study. Much of the data collection has occurred incidentally with accompanying biological or ecological research and generally recorded data such as temperature, salinity, turbidity, D.O., and pH of waters. Four waterbodies in GUIS, Mississippi Sound, Big Lagoon, Pensacola Bay, and

Choctawhatchee Bay, do not meet the standard set for their use and are listed as impaired. The study of groundwater resources for GUIS is limited. Two studies such studies examined groundwater near Fort Pickens in the 1990's. The first study found that most of the groundwater samples met Florida state quality requirements for drinking water. However, two wells exhibited high levels of total dissolved solids and several wells had high levels of enterococci and fecal coliforms. The second study focused on the impact of a nearby septic system leachfield upon the groundwater and surrounding surface water and examined the bacterial and nutrient contamination.

There has been no data collected within the park on air quality. However, there are a number of monitoring stations around the state that can be accessed to determine park air quality. National Atmospheric Deposition Program/National Trends Network sites have documented a slight decrease in wet sulfate concentration and deposition, but no trend in wet nitrate concentration and deposition and no trend in wet ammonium concentration and deposition. An air quality monitoring station may be installed at Fort Pickens. This equipment would monitor ozone, sulfur dioxide, nitrogen dioxide, mercury, and a number of hydrocarbons, including toluene, benzene, formaldehyde, methane, and ethanol and would be operational by Spring 2005.

There are a number of aquatic and terrestrial ecosystems that exist in GUIS including the Gulf, dunes, marsh, Sound or bay, mainland forest, seagrass beds, and barrier island, which consist of interdunal, upland woods, and salt marsh. Mainland forest habitat varies for each unit. GUIS-FL consists of live oak, sandhill, and marsh communities and GUIS-MS is made up of pine/palmetto flatwoods, mixed pine/hardwood, lowland hardwood, and tidal marsh. Many of these habitats have been studied intensely. The Mississippi Sound, one of the largest ecosystems in the park, has been the focus of many studies that examined a variety of organisms, including plankton, crustacean, mollusks, and fish. The ponds and lagoons of GUIS are unique enclosed ecosystems and have also been the focus of extensive research, much of which examines the general ecology of these inland waters and focused on Horn, Petit Bois, and Santa Rosa Islands. Numerous additional studies have occurred on the barrier islands examining vegetation, migratory birds, and a variety of mammals and their effect on island vegetation. Studies also have examined the beach and dune habitats of GUIS and the animal populations that using these habitats. The surf zones of the islands of GUIS, particularly Horn and Ship Island and Perdido Key, have been the site of many fish and invertebrate community studies. The seagrass beds within the park represent a unique and fragile ecosystem that has received much research effort. Multiple studies have found a decline in the diversity of some seagrass beds.

Many of the park's management issues concern the protection of natural resources and mitigating the effects of various types of disturbance such as human use, beach nourishment, and storm impacts. Human use has caused both direct (destruction of habitat from pedestrians and vehicles, dredging, and development) and indirect (contamination [e.g., trash, oil and coal spills, and pesticide use] and introduction of exotic species) management concerns for the park. Due to the inaccessibility of the GUIS-MS barrier islands, most of the direct anthropogenic disturbance has occurred on GUIS-FL. Multiple studies have examined the effects of off-road vehicles and pedestrians on the dunes and the dune flora of GUIS-FL and restoration programs for these habitats. Hurricanes are one of the biggest concerns for the park as they can have a devastating effect on the biological communities and park structures and facilities, and cause morphological

shoreline changes. Beach erosion is also a prevalent management issue at GUIS and many efforts have been made to study and manage this problem. To combat erosion, the beaches of GUIS have been regularly nourished with sand, which generally comes from the dredging of passageways. In one such project, which began in 1989, approximately 4.1 to 4.3 million cubic meters of dredged material from the Pensacola Passage were placed on the eastern 7.5 kilometers of Perdido Key, FL. The project was extensively monitored from prior to the start of nourishment continuing until at least 1997. Although these nourishment projects are beneficial to the reduction of erosion, there is concern about the effects on the flora and fauna of the park and whether the benefits would be eliminated during hurricanes. Recent studies have found that 56% of the original nourishment material remained at the construction site despite repeated hurricanes. Additional studies have found revegetation of the area was slow but successful, there were adverse effects on macroinvertebrate populations, and there was a reduction in seed bank development.

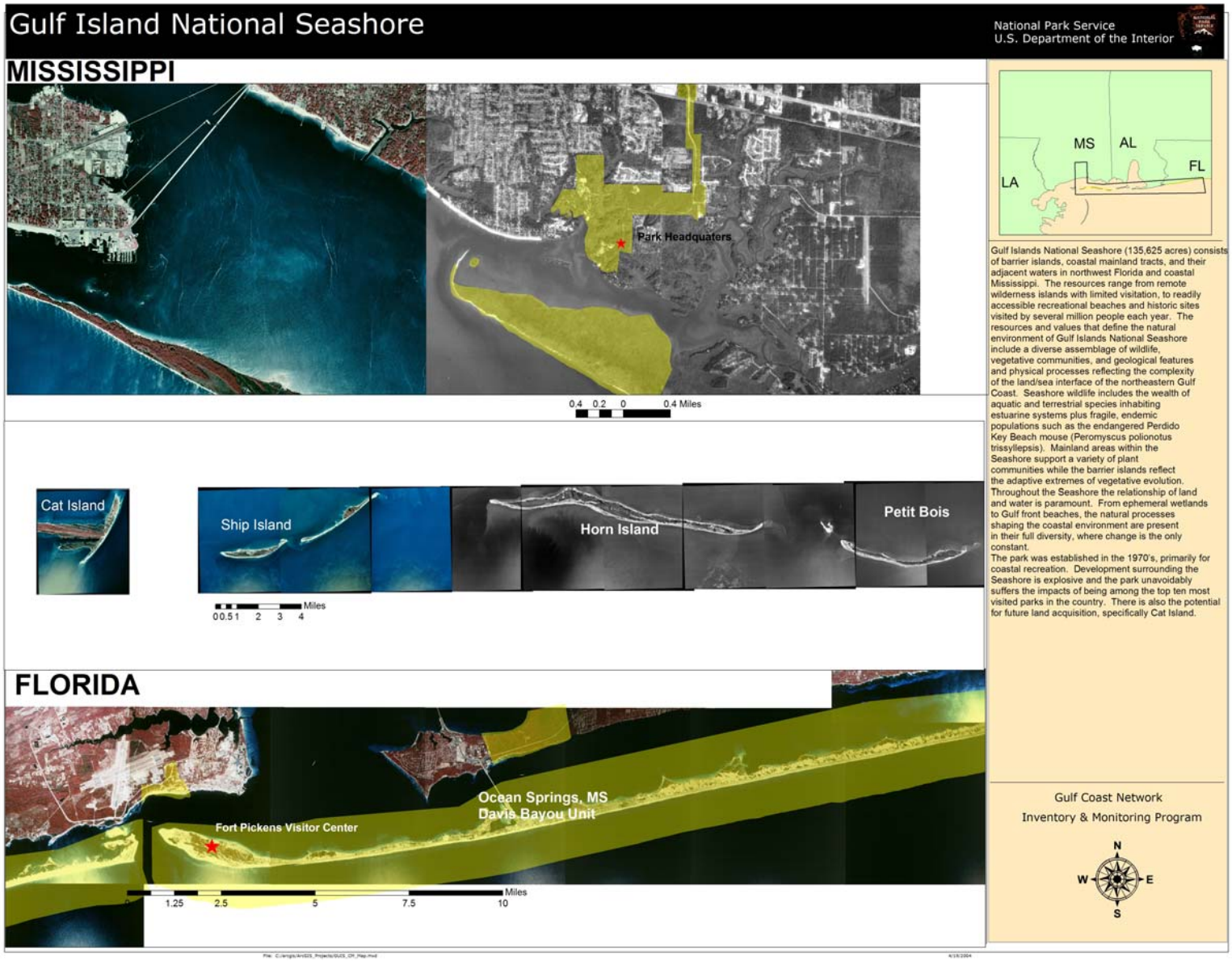

Figure 1. Location and extent of the GUIS, one of eight parks in the Gulf Coast Network.

RESEARCH REVIEWS

The National Park Service's (NPS) Gulf Islands National Seashore (GUIS) consists of several units in both Florida and Mississippi. The Mississippi section of Gulf Islands National Seashore (GUIS-MS) consists of five islands and a small mainland headquarters. From the west to east, the islands of GUIS-MS are: Cat, West Ship, East Ship, Horn, and Petit Bois Islands. East and West Ship are separated by a small pass and are occasionally referred to singly as Ship Island. Fort Massachusetts is a historically important area located on West Ship Island. Horn Island is the largest and Cat the most recently acquired of the GUIS-MS islands. Davis Bayou is the only mainland area in the GUIS-MS park section. Dauphin Island, AL to the east is somewhat geographically contiguous with the GUIS-MS islands; some studies occurring on Dauphin Island have been included in the summary. Together, these islands form part of the southern boundary of Mississippi Sound.

The Florida section (GUIS-FL) consists of portions of two islands and two small mainland areas. The western island is Perdido Key; the eastern section of which is in the national seashore. The easternmost island of GUIS-FL is Santa Rosa Island. Three park units are located on Santa Rosa Island, Fort Pickens, Santa Rosa Area, and Okaloosa Area. Fort Pickens is a historically important area located on the western tip of Santa Rosa. To the north of Pensacola Bay is Fort Barrancas, an area of GUIS-FL that has received little study. The Naval Live Oaks Reservation is on a peninsula forming part of the eastern mouth of Pensacola Bay. Unlike the GUIS-MS, all the areas of GUIS-FL, including the islands, are accessible to vehicles. The waterbodies surrounding GUIS-FL include Santa Rosa Sound, Big Lagoon, Pensacola Bay, Choctawhatchee Bay, and the Gulf of Mexico.

Claxon and Worthen (1990) wrote a book addressing the history of scientific research at GUIS.

BIOLOGICAL RESOURCES

The biological communities of GUIS have been extensively studied. Predictably, much of the study has focused on coastal, marine, estuarine, and insular island communities. The park is home to a number of threatened and endangered species. Although scientific research has been conducted in the area since the early and mid 19th century, most effort has occurred since the 1950s.

GENERAL SURVEYS AND CHECKLISTS

There are several surveys and general checklists concerning the flora and fauna of GUIS. Richmond (1962, 1968) compiled lists of the flora and fauna of Horn Island. Valentine (1967) reported on the wildlife potential of the proposed GUIS. Cooley (1978) inventoried the animals occurring in the Pensacola Bay estuary, discussing abundance, distribution, habitat, and season. As part of an environmental assessment and biological impact study for land owned by University of Western FL on Santa Rosa Island, Moshiri et al. (1980b) discussed the biotic communities of the area including plant and animal communities and endangered species. McPhail and Hopkins (1994) compiled a list of taxa observed during a field survey of a savannah near Davis Bayou in January 1994. As part of a larger study, Snyder et al. (1996) surveyed the

flora and fauna of three ponds on Santa Rosa Island. A series of notes produced by the NPS contained a summary of plant and animal sightings on Horn Island between 1982 and 1995 (NPS 1995). There are also several miscellaneous species checklists compiled by park staff (Author unknown n.d.-c, f; Russell and Cupp n.d.).

VEGETATION

The terrestrial and aquatic vegetation of GUIS has been extensively studied. Many of the terrestrial studies have focused on general plant ecology and dynamics while relatively few treat specific species. Slash pine (*Pinus ellottii*) and live oak (*Quercus virginiana*) have received some research effort that is cited in the tree studies section. Species- specific research has been more common for aquatic plants due to the substantial effort directed toward seagrasses. However, many of the aquatic plant studies have also focused on general ecology and community structure. According to the NPSpecies database, 875 vascular plant species have been reported on GUIS although 193 species have not been confirmed.

Terrestrial

Surveys and checklists

A variety of general surveys have been conducted of the terrestrial plants of GUIS. Miller and Jones (1967) conducted surveys of the vascular plants occurring on Ship Island. Deramus (1970) conducted a four year survey of the vascular plants of Dauphin Island, AL, adjacent to GUIS, discussing occurrence, distribution, abundance, and habitat. Robinson (1975) conducted preliminary mapping of the vegetation of East Ship, Horn, and Petit Bois Islands. Hansen (1977) surveyed the plants of the Fort Pickens area and described plant communities. The Gulf Coast Research Laboratory published a report on a quantitative study of the plant communities found on Horn and Petit Bois Islands (Author unknown 1979). Jones (1982) compiled a list of the vascular plants of the Davis Bayou area of GUIS-MS. Sloey (1986) compiled a list of vascular plants collected from Fort Pickens. Looney et al. (1993) conducted a survey of the flora of Perdido Key. The report includes discussions of the history of the island's vegetation and compares it to the vegetation of other barrier islands.

There are several physical collections of pressed plants or photographic guides to GUIS plants. Barry (1990) compiled a collection of pressed seashore plants from GUIS. An undated collection of plants by Miller contains 204 specimens of plants found on GUIS. Stopp and Breithoff (n.d.) compiled a photographic guide to the plants of Santa Rosa Island.

The Gulf Coast Network currently has proposals for new vascular plant inventories for the park.

General studies

Multiple studies have focused in part on the ecology and distribution of vegetation in the area. In an early study, Penfound and O'Neill (1934) studied the vegetation of Cat Island. Other early

work by McFarlin (1941) consisted of a vegetation study of Santa Rosa Island in which the author discussed plant distribution, geology, and general ecology of the area.
Miller and Miller (1972) and Miller (1973, 1975) examined vegetation dynamics on Ship Island discussing distribution and succession. The effects of hurricanes upon the island's forests were discussed. A 1974 proposal by Eleuterius and McDaniel included a species list of plants found on GUIS-MS (Eleuterius and McDaniel 1974). Eleuterius (1979b) and Eleuterius and Beaugez (1979) conducted a comprehensive study of the plant ecology of Horn and Petit Bois Islands. The study included an exhaustive collection of vascular plants and discussed vascular and nonvascular plant ecology. The report included detailed descriptions of physical environments and plant communities and made special discussions concerning live oak and slash pine. Also included are discussions on the effects of various types of disturbances. Cousens (1981) conducted a phytosociological study of the plants of Perdido Key. Burkhalter (1987) studied the ecology of the coastal vegetation of western Santa Rosa Island. He calculated species frequency and constancy and calculated a correlation of species similarity with other Northern Gulf locations. Gibson and Looney (1992) studied seasonal variations in vegetation on Perdido Key. They established 224 plots that they examined through a complete seasonal cycle. They distinguished seven vegetation types. The most seasonal variation was discovered to occur in the dune vegetation category and the least variation occurred in woody and marsh vegetative habitats.

Several researchers have used GIS techniques to study the plant communities and habitats. Rosso and McPhail (1991) used GIS applications to map the plant communities of GUIS. Communities were described and findings were compared with those of previous studies. Hattaway (1996) compiled a file of information concerning six potentially threatened or endangered plant species found on GUIS. The purpose was to provide resource managers with the information necessary to protect the plants and to promote the exchange of information between resource managers and biologists and the Florida Natural Areas Inventory. The file described the plants and their habitats and locations on GUIS. Heitshmidt et al. (n.d.) used GIS and remote sensing to characterize vegetation cover of Petit Bois Island.

Several efforts have examined plant distribution and abundance incidentally as part of separate ecological studies. As part of a larger study, Long (1974) reported on the botany of Navarre Beach on Santa Rosa Island. As part of a beach mouse reintroduction study, Holler and Mason (1988) described and noted the abundance of vegetation at release sites within GUIS. Holler and Moyers (1991) and Holler et al. (1992) studied populations of the endangered Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*) during a beach nourishment project. The study involved trapping and vegetation studies on Perdido Key. Stopp and Breithoff (1996), as part of a larger successional study, compiled a list of common plants of the Fort Pickens area.

Miller (1973) studied the impact of continuous physiographic change upon the vegetation of Ship Island, MS and in 1974 studied the impact of two hurricanes upon the vegetation of the island (Miller 1974). Cousens (1987, 1988) reported on an eight-year study of the phytosociology and the revegetation of the GUIS portion of Perdido Key following Hurricane Frederick. The study included two major emphases. The first examined the recovery of pioneer vegetation within the various habitat types on the island. The second was to produce detailed characterizations of the vegetative habitats. Habitat types discussed included stabilized dunes,

swales, slash pine and sand pine (*P. clausa*) forests, and marsh. Vegetation was sampled in transects across the island; coverage and frequency values for the understory were estimated as well as diameter values for the overstory. A variety of environmental data were recorded including meteorological and soil data. The report included a discussion of the impact of Off Road Vehicles (ORVs) on vegetation and artificial revegetation efforts.

Tree studies

With only a few exceptions, tree studies for GUIS have focused on slash pine and live oak species. The Naval Live Oaks Reservation of GUIS-FL has been managed for timber conservation and research since the late 18th century. Pessin and Burleigh (1941) studied the forest ecology of Horn Island, MS. Miller and Miller (1972), Miller (1975), and Miller and Stoneburner (1976) reported on the effects of hurricanes on insular tree species on Ship Island, MS. Stoneburner (1978) studied the effect of hurricanes on slash pine forests on barrier islands on GUIS. As part of a comprehensive plant study of Horn and Petit Bois Islands, Eleuterius (1979b) included special discussions of slash pine and live oak. Hoffard and Oak (1980) evaluated slash pine mortality around Fort Pickens. Snell (1983) detailed timber preservation efforts at Live Oak Reservation between 1794 and 1880. Carter and Young (1993) studied the stress endured by slash pine and wax myrtle (*Myrica cerifera*) on Horn Island. To assess stress they measured leaf conductance, spectral reflectance, and concentration of chlorophyll a and b. Edmisten (1974) used core sampling and diameter measurements to determine the age of live oak trees in the Live Oaks Reservation. He reported that the oldest tree studied was between 61 and 70 years old and surmised that the present location of the Reservation was previously covered with pine species. A GUIS vegetation management plan for the Naval Live Oaks Reservation, the first forest experiment station in the U.S., discussed the history, condition, and management of the live oaks (GUIS n.d.). It described historical vegetation from 1828 until the date of the report. The ecosystem of the forest was detailed, including soils, animals, and weather impacts. Fire prevention and management systems were described.

Beach and dune vegetation

Limited study has focused on beach and dune vegetation species. Hugley and Eleuterius (1976) compared dune vegetation on Horn Island, with vegetation on Belle Fountaine Beach, MS. They used similarity measures to compare species lists. Hall (1978) studied beach phytomass on Horn Island. Dowling (1982) prepared a plan for the restoration of smooth cord grass (*Spartina alterniflora*) in the Davis Bayou area of GUIS-MS. The plan detailed all aspects of the project and included lists of area flora. Harvey (1990) prepared a plan for the restoration of dune vegetation on Santa Rosa Island. Following a proposal by Gibson (1989), Gibson and Looney (1990, 1992, 1993, 1994), Gibson and Ely (1994), and Gibson et al. (1997) studied the effects on vegetation of a beach nourishment project on Perdido Key. Strand, back slope, dune, wooded dune, dry swale, wet swale, and marsh habitat types were identified and monitored. Indicator species were identified. The authors found considerable variation in indicator species from year to year. Factors affecting the results included: storm surge, spatiotemporal influences, sand nutrient/waste composition changes, beach topography changes, and nutrient depletion. Overall, revegetation was determined to be slow but successful. This slow rate of succession was thought to be caused by natural disturbances such as hurricanes. Gibson and Looney (1994) described

the colonization of the dredge spoil in the first year after nourishment. Species cover data were compared between spoil sites and sites on the main island and those above the old mean high water mark. They recommended the additional dredge spoil not be added for a number of years. Looney and Gibson (1995) examined and compared the soil seed bank of seven habitat types, deposited dredge spoil and unvegetated sites. They found that those sites with little disturbance had highly developed seed banks compared with those that were frequently disturbed.

Fungi

Very little study of fungal species has been conducted on GUIS. Weber (1989) and Cibula and Weber (1996) described *Hygrocybe andersonii,* a new species, on Horn Island. *H. andersonii* is unique to barrier islands and coastal dunes and is always associated with the shrub seaside rosemary (*Ceratiola ericoides*). They described morphological and biochemical distinguishing characteristics.

Lichen

Yahr (2001) examined the restoration of Florida perforated cladonia (*Cladonia perforata*), an endangered lichen, on Eglin Air Force Base on Santa Rosa Island after Hurricane Opal.

Aquatic

Surveys, general studies

These are surveys of studies of general aquatic vegetation ecology. Humm and Caylor (1957) studied the summer marine flora of Mississippi Sound. U.S. Fish and Wildlife Service (USFWS) staff field notes from 1963 contained observations on the aquatic vegetation of Santa Rosa Island (USFWS 1963). Eleuterius (1971, 1973) surveyed the aquatic plants of Mississippi Sound and adjacent waters. Dredge samples were collected from grid transects to determine seagrass and algal habitat distribution. Eleuterius (1974) reported on the establishment of plants in spoil areas of Mississippi Sound and adjacent waters. Snyder et al. (1997) studied the effects of Hurricane Opal in 1995 on the aquatic habitats of the Fort Pickens area of GUIS. The study found significant saltwater intrusion, shoreline loss, and vegetation loss at four natural ponds. Eleuterius (n.d.) compiled a literature review of the marine vegetation of Mississippi Sound.

Seagrass

The seagrass beds of GUIS represent unique ecosystems and have been the focus of extensive study. Much of the effort has been dedicated to understanding seagrass bed health and the effects of various disturbances. Eleuterius and Miller (1976) studied the impact of Hurricane Camille on the seagrass beds of Mississippi Sound six years post-hurricane. They used observation, dredging, and infrared photography to compare current condition of seagrass beds with pre-hurricane conditions. In a U.S. Army Corps of Engineers report, Winter (1978) evaluated the seagrass resources of Santa Rosa Island. Eleuterius (1989) studied the loss of seagrasses from Mississippi Sound and discussed human causes for the loss. Heck et al. (1996) and Heck and Zande (1997) conducted surveys of the seagrass beds of GUIS and reported on the

results of several studies of seagrass health. They described a previous study of seagrasses in Big Lagoon following Hurricane Opal in 1995 that reported seagrass degeneration due to burial. They also discussed a short-term study of Big Lagoon and Santa Rosa Sound that indicated that turtle grass (*Thalassia testudinum*) and shoal grass (*Halodule wrightii*) populations were presently healthy in the GUIS-MS areas sampled while GUIS-FL sites showed decline. There is currently no turtle grass on GUIS-MS. Manatee grass (*Cymodocea filiformis*) populations were in decline generally, having disappeared from the GUIS-MS sampling sites. Heck et al. (1996) included recommendations for management and monitoring.

Several studies have examined the production and growth of seagrass beds. In complimentary reports Sullivan et al. (1991), Daehnick et al. (1992), Moncreiff et al. (1992), and Moncreiff (1993) reported on a study of the primary production of seagrass beds in Mississippi Sound. The biomass of seagrass and associated epiphytes was determined in selected areas and primary production was calculated. Phytoplankton production was estimated. The effects of epiphytes on seagrasses and grazing of seagrass epiphytes were discussed as was the relation of light and productions. The Daehnick study involved analyzing core samples for phytoplankton and chlorophyll concentrations. Reports included a list of algal species found and various environmental measurements. Wear (1995), Sullivan and Wear (1996), and Wear et al. (1999) studied the effect of fertilization on the seagrasses and their epiphytic algae in the Big Lagoon, Perdido Key area. They examined three species of seagrass and identified their three major classes of epiphytes. The study showed significantly increased growth of epiphytes in the study area and indicated that cultural eutrophication could cause problems for this area. Wear et al. discussed the possible elimination of 1-2 species and the conversion of Big Lagoon to a monoculture. Switzer (1996) conducted a study on the colonization of artificial seagrass off of Horn Island. He examined how the habitat modification would affect crabs and fish.

Algae

These studies concern algae ecology and distribution. Eleuterius (1971, 1973) surveyed the aquatic plants of Mississippi Sound and adjacent waters. Dredge samples were collected from grid transects to determine seagrass and algal habitat distribution. Perry et al. (1979) reported on the first recorded red tide algal bloom in Mississippi Sound. The bloom of *Gonyaulax monilata* was aerially mapped and tracked. Water samples were used to determine algal concentration. Perry and McLelland (1981) described and mapped the first recorded outbreak of the dinoflagellate *Prorocentrum minimum* in Mississippi Sound. Young (1986) studied a bloom of *Prorocentrum* cf. *micans* in Little Sabine Bay and Santa Rosa Sound. As part of a study examining primary production in seagrass beds in Mississippi Sound, Sullivan et al. (1991), Daehnick et al. (1992), Moncreiff et al. (1992), and Moncreiff (1993) studied the primary production of associated epiphytic algae. The effects of light upon production and chlorophyll levels were discussed. The report included a list of algal species found. Wear (1995) and Sullivan and Wear (1996) studied the effect of fertilization on seagrasses and their epiphytic algae in the Big Lagoon, Perdido Key area. The study examined three species of seagrass and identified their three major classes of epiphytes. The study showed significantly increased growth of epiphytes in the study area.

Experts: Terrestrial: David Gibson and Lionel Eleuterius;
Aquatic: Lionel Eleuterius (general), Kenneth Heck and Michael Sullivan (seagrasses)

MAMMALS

Much of the mammal research conducted at GUIS has focused on several species of concern. Several subspecies of beach mice, including the endangered Perdido Key beach mouse, are found in the park and these mice have been studied regularly since the 1950s. During the last 15 years, endangered red wolves (*Canis rufus*) have been raised on Horn Island for release at suitable inland sites, most notably Smokey Mountain National Park. Feral hogs (*Sus scrofa*) are no longer present in the park but were previously studied on GUIS-MS.

Surveys and checklists

Several surveys of GUIS mammals have been conducted. Russell and Cupp (n.d.) created a checklist of mammals for GUIS. A collection of sea turtle and marine mammal sighting and stranding data for 1982 contained several listings for GUIS. Richmond (1962) detected the swamp rabbit (*Sylvilagus aquaticus*), house mice (*Mus musculus*), and Norway rats (*Rattus norvegicus*) on Horn Island. None of these species have been detected on any of the subsequent surveys. Eleuterius (1979) and Anderson (in Sugg 1973) both described the occurrence of muskrat (*Ondatra zibethicus*) on Horn and Petit Bois Islands. Anderson (in Sugg 1973) also described the sighting of a tree squirrel (*Sciurus* sp.) on Horn Island but subsequent surveys have not detected this species. Wolfe (1985) conducted the first systematic mammal survey of the mammals of the barrier islands GUIS-MS using trap line transects, tracking plots, and mist nets. Horn Island had the highest diversity of mammal species (7 species, only three of which were native) detected while the other islands had three or less. Raccoons and nutria were the only species detected on all for islands. Esher (1987) and Esher et al. (1988) conducted a comprehensive survey of the mammals of Horn, East and West Ship, and Petit Bois Islands. Nine species, evening bat (*Nycticeius humeralis*), nutria (*Myocaster coypus*), eastern cottontail (*Sylvilagus floridanus*), black rat (*Rattus rattus*), rice rat (*Oryzomys palustris*), muskrat, raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), and feral hog, were documented during this survey. Feral hogs and nutria caused disturbance to the vegetation but cottontails were felt to be the biggest threat due to their abundance. Drs. Trousdale and Beckett, University of Southern Mississippi, began bat surveys during spring 2003 and will continue in 2004. An annual interim report is due in FY 2004. There are also several miscellaneous collections of data and summary reports dealing with mammal species on GUIS. Twenty-nine marine mammals have been documented in the Gulf of Mexico, but only two species of dolphin, Atlantic bottlenose (*Tursiops truncatus*) and spotted (*Stenella frontalis*), are common to the area (GUIS 2004).

General studies

The research in this section includes studies of general mammal ecology, behavior, and distribution. Wolfe (1976) studied the mammalian fauna of Horn Island. Herring (1988) discussed the dietary habits of nutria, eastern cottontail, and raccoons on Horn Island. Nutria and

cottontail feeding habits were observed *in situ* and specimens of both species were dissected to determine stomach contents. As part of a comprehensive mammal study of the GUIS-MS islands, Esher (1987) and Esher et al. (1988) studied the effect of foraging by mammals upon the vegetation of the islands. Mammalian impact was noted to cause slower recovery and weaker plants but did not appear to eliminate any plant species. Mills et al. (1998, n.d.) studied the presence of Hantavirus antibodies in small mammals from 39 national parks, including GUIS. Antibody positive rodents were found throughout the study area, although not at GUIS, with rice rats showing the highest incidence.

Individual species, group studies

Feral hogs

Brent and Corcoran (1977) studied the effect of feral hogs on the stability of Horn Island. A study by Singer (1981) discussed feral hogs in the nation's National Parks. The report included assessment of impact for various parks. According to the author, feral hogs cause minimal damage on GUIS. Baron (1979, 1982) analyzed the effect of feral hogs on the vegetation of Horn Island. Vegetation was sampled, and stomach contents and scats were analyzed. Studies determined the most affected vegetation types and suggest that damage is not as severe as predicted. As part of a study of the mammal – habitat relationships on Horn, Ship, and Petit Bois Islands, Wolfe (1985) conducted an exclusion study to measure the effects of feral hogs upon vegetation.

Beach mouse studies

Beach mice (*P. polionotus*) are a coastal species found along many seashores of the Gulf Coast. Two subspecies of beach mouse are found on GUIS-FL, including the endangered Perdido Key beach mouse. Beach mice have been one of the most studied mammal species in the park and surrounding areas. Blair (1946) estimated the number of the Santa Rosa beach mouse subspecies (*P. p. leucocephalus*) on Santa Rosa Island. Blair (1951) studied population structure, social behavior, and environmental relations of the Santa Rosa beach mouse on Santa Rosa Island. The study included discussions of behavior, habitat, food, track records, and holes. Westergard (1977) compared the behavior of two species of beach mouse (*P. p. leucocephalus* and *P. p. polionotus*) from GUIS-FL. Wolfe (1981) conducted a survey of the Santa Rosa beach mouse on Santa Rosa Island. He used trap lines to capture mice and marked mice for further recapture study. Populations were estimated and compared with estimates of previous research. In an inbreeding depression study, Brewer et al. (1990) compared the fitness of insular populations of the Santa Rosa beach mouse with mainland populations from FL, Texas, and New York. Gore and Schaefer (1993) conducted a survey of the Santa Rosa beach mouse.

Efforts have been made to reintroduce and monitor the endangered Perdido Key beach mouse to Perdido Key, GUIS-FL. Wolfe (1979) proposed a project to reintroduce the Perdido Key beach mouse. The proposed study called for sufficient numbers of mice for repopulation to be bred and raised in captivity. Holler and Mason (1988) conducted a study to reintroduce the mouse to GUIS. The study described release methods and release site vegetation. Data concerning observed mammal tracks, mouse populations, abundance of vegetation, and numbers of

reintroduced mice were discussed. Holler et al. (1989) reported on the Perdido Key beach mouse reestablishment program. The article described how mice were relocated from Gulf State Park, AL to Perdido Key and discussed release site vegetation and population evaluations. A 1990 report to the technical steering committee reported on the preliminary population studies of the endangered Perdido Key beach mouse on GUIS-FL (Author unknown 1990). The report summarized data gathered from 512 trapping stations placed along a continuous 7-km transect during four months in 1989 and 1990. The report included data on age, sex, reproductive status, and population data and answered specific questions about the proposed beach mouse population study. Holler and Moyer (1991) and Holler et al. (1992) studied populations of the endangered Perdido Key beach mouse during a beach nourishment project. The study involved trapping and vegetation studies on Perdido Key, GUIS-FL. Oli et al. (2001) studied the long-term viability of two isolated populations of beach mice along the Gulf Coast of AL, Perdue unit of Bon Secour National Wildlife Refuge, and GUIS-FL. They found that both the Alabama beach mice (*P. p. ammobates*) and the Perdido Key beach mice would likely go extinct unless habitat fragmentation was reversed. They also suggested that further habitat loss be curtailed and populations of beach mice be re-established in their historic range when possible.

Beach mice are a coastal species found along many seashores of the Gulf Coast. The studies in this section took place near GUIS and are pertinent to the study and conservation of mice in the park. Sumner (1926) analyzed geographic variation in mice from FL and AL. Bowen (1968) studied the evolution and variation of beach mice along the FL Gulf Coast. Newly and previously captured specimens were studied and crossed in the laboratory. The morphology, taxonomy, evolution, and genetics of beach mice were discussed. Linzey (1978) discussed the Perdido Bay beach mouse in a book entitled "Rare and Endangered Biota of Florida." Humphrey and Barbour (1981) studied the status and habitats of three subspecies of beach mouse in FL. The study consisted of live trapping and marking Perdido Key, Choctawhatchee (*P. p. allophrys*), and pallid (*P. p. decoloratus*) beach mice in various habitats. Authors discussed habitat and estimated population sizes. Meyers and Bentzien (1983) studied the habitat characteristics and the potential predators and competitors of subspecies of beach mice on the Gulf Coasts of AL and FL. Holliman (1983) studied the demographics and habitats of the Perdido Key beach mouse and the Alabama beach mouse on the Gulf Coast of AL. A 1987 USFWS document contained a recovery plan for the Choctawhatchee, Perdido Key, and Alabama beach mice (USFWS 1987). Bates (1992) reported on the distribution of beach mice in the coastal parks of northwest FL. Moyers et al. (1996) surveyed the status and distribution of Gulf Coast species of beach mouse. Four species of mouse from the northwest coast of FL were studied in capture and release surveys. Species discussed were: Perdido Key beach mouse, Choctawhatchee beach mouse, Alabama beach mouse, and St. Andrews beach mouse (*P. p. peninsularis*). Moyers et al. (1999) published a report that described the distribution and status of the Perdido Key, Choctawhatchee and St. Andrew beach mice.

Red Wolf rearing program

Horn Island, GUIS-MS has been used to raise wild populations of the endangered red wolf for release into suitable inland environments, primarily Great Smokey Mountains National Park. Parker (1988) submitted a proposal to establish a temporary population of red wolves on Horn Island in order to obtain wild-reared offspring for research. Esher et al. (1990) and Simons

(1990) reported on the progress of red wolf propagation activities on Horn Island. Wolves were monitored by radio telemetry. Wolf scat analyses and small mammal population studies were conducted. In 1993 Esher and Simons again summarized the progress of the red wolf program. Monitoring with radio telemetry continued (Esher and Simons 1993). Scat analyses were performed and small mammal populations were sampled by trapping and tracking station and transect observations. Captured rabbits were aged. An undated compilation by Esher contained data tables concerning small mammal studies and red wolf trapping and tracking (Esher n.d.). Bender (1994) addressed a variety of endangered species issues in National Parks, including a discussion of red wolves raised at GUIS for release in the Smokey Mountains. Weller (1995) studied the diets of red wolves on Horn Island. The study contained a literature search and a history of the Red Wolf program. Radio telemetry was used to monitor wolf behavior. The contents of 650 scats were analyzed using various statistical methods.

Other species

Abel (1996) did a population study of the red fox (*Vulpes vulpes*) on Perdido Key. Peterson and Hoggard (1996) reported on the first recorded sperm whale (*Physeter macrocephalus*) in MS. The neonate female was stranded on Horn Island where it was euthanized. A necropsy was performed and blood, tissue, and stomach content samples were taken for analysis.

Experts: Robert Esher (general), Nicholas Holler (beach mice), Robert Esher (red wolves)

HERPETOFAUNA

Surveys and checklists

This section lists general herpetological surveys conducted for GUIS. Allen (1932) conducted a survey of the reptiles and amphibians of Harrison County, MS. Scanlon and Nichols (1953) prepared a report on the reptiles and amphibians of the Gulf Coast Research Laboratory in Ocean Springs. Garnett (1980) compiled a herpetofaunal list for GUIS. Seigel and Doody (1996) reported on a two year study to inventory the species composition and abundance of reptiles and amphibians of all areas of GUIS. Herpetofauna were sampled using a variety of trapping and netting techniques and were surveyed in the field under natural conditions. The study discussed species-specific habitat requirements and made recommendations for long-term monitoring. A draft plan exists for the inventory and monitoring of GUIS herpetological communities (Author unknown n.d.-a). A current survey of the herpetofauna of GUIS is being conducted by Dr. Carl Qualls, Mississippi State University, who began fieldwork for reptile and amphibian inventories during spring 2003.

General studies

Seigel et al. (1997) reported on a three year study examining the impact of hurricanes Erin and Opal on the populations and habitat of the herpetofauna of the Fort Pickens, Live Oaks, and Horn

Island areas of GUIS. Fifty-three species were examined and data indicates the damage to habitat and populations was relatively minor.

Reptiles

The reptiles of GUIS have not been extensively studied. With the exception of marine turtle protection and monitoring programs, most of the reptile research has been in the form of surveys. The park is home to several species of concern such as the gopher tortoise (*Gopherus polyphemus*), which has received some limited study, and the eastern indigo snake (*Drymarchon corais couperi*).

Surveys and checklists

Logan (1979) conducted a preliminary survey of gopher tortoise populations on GUIS-FL. The survey consisted primarily of walking through the area and noting potential tortoise burrows. Valentine (1980) surveyed gopher tortoise populations on GUIS-FL. Jackson (1983) surveyed rare, threatened, and endangered species of birds and reptiles from GUIS-MS. Surveys were conducted over four years. He listed four reptilian species and 17 bird species found on the park during various times of the year. Species accounts are included and detail previous documentation of each species on the park. An undated list of unknown authorship lists the reptiles verified to occur on GUIS (Author unknown n.d.-c). Eighteen species of snakes have been document on GUIS (GUIS 2004).

General studies

Marine turtles

Marine turtles nest yearly on the GUIS beaches. All species found in the park and surrounding waters are threatened or endangered. Shabica (1980) reported on leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) sea turtle activity on GUIS between 1976 and 1979. The summary includes date, location, and comments on sightings. Zimmerman and Hopkins (1992a) prepared a summary of sea turtle nesting activities on GUIS for the years 1989-1991 that included recommendations for monitoring and management. Zimmerman and Hopkins (1992b) prepared a plan and accompanying handbook for monitoring sea turtle activity on GUIS. Reinhold (1994) reported on the distribution and abundance of sea turtles nesting on GUIS-FL. Nicholas and Jacks (1996) prepared a summary of loggerhead and green sea turtle nesting and monitoring activity for GUIS-FL. The report describes methods used to mark and monitor nests and presents data concerning total nests and nest depredations. Jacks (1997) summarized nesting and nest monitoring activity for loggerhead and green sea turtles at GUIS-FL from 1994-1996 and discussed problem areas.

Much of the scientific data concerning marine turtles exists in the form of data sheets and monitoring surveys. A collection of sea turtle and marine mammal sighting and stranding data for 1982 contains several listings for GUIS (Author unknown 1982). Data show sea turtle nesting activities on Pensacola Beach, Perdido Key, and Santa Rosa Island for 1995 (Author unknown 1995a, b, c). Other data show sea turtle nesting activities for GUIS-FL for 1996

(Author unknown 1996a). There is also a collection of overflight observations of turtle crawls for 1990 to 1996 for GUIS-MS (Author unknown 1996b). There are also collections of hatchling disorientation incident reports (Author unknown n.d.-e) and summary reports of sea turtle and marine mammal strandings on GUIS (Author unknown n.d.-d).

Other taxa

Seigel, and Fitch (1985) studied annual variation in snake reproduction in fluctuating environments.

Experts: Richard Seigel and Carl Qualls (general), Allen Jacks and Carl Zimmerman (Sea turtles)

Amphibians

Very little research has been conducted on amphibians at GUIS. Most of it is in the form of general herpetological surveys reported on previously. There have been no studies on GUIS that focused entirely on amphibians. Within GUIS-FL, more amphibian species (14) have been documented at the Naval Live Oaks Area (GUIS 2004).

Experts: Richard Seigel and Carl Qualls (general)

BIRDS

A relatively large amount of research has been conducted on the birds of GUIS. The park and surrounding area provide year-long or temporary habitat for several species of concern including Piping Plovers (*Charadrius melodus*), Bald Eagles (*Haliaeetus leucocephalus*), Peregrine Falcons (*Falco peregrinus*), and Red-cockaded Woodpeckers (*Picoides borealis*). The islands of GUIS provide habitat to a variety of shorebirds. Additionally they are important stopover points for songbirds migrating across the Gulf of Mexico and significant research has been directed toward understanding habitat use and biology of these migratory species. Over 280 species of birds have been documented on GUIS (GUIS 2004).

Surveys and checklists

In an early survey, Evermann (1886) compiled a list of birds observed at Pensacola, FL. Weston (1965) conducted a survey of the birds of Escambia, Santa Rosa, and Okaloosa counties of Fl. Report includes discussions of physical environment and data on the ecology and behavior of area birds. Weber et al. (1978) produced bird observation checklists for Horn Island compiled in the early 1970s. Jackson (1983) surveyed rare, threatened, and endangered species of birds and reptiles on GUIS-MS. Surveys were conducted over four years. He listed four reptilian species and 17 bird species found on the park during various times of the year. Species accounts are included and detail previous documentation of each species on the park. Duncan (1988a)

published a checklist and a book of birds for Escambia, Santa Rosa, and Okaloosa counties FL, coastal counties containing GUIS land. It contains species lists and data on behavior and demographics. Aborn (1994) compiled a list of migratory birds stopping over on Horn Island, MS. Bartone and Cody (1996) proposed a wintering bird survey for GUIS-FL. The Breeding Bird Survey, a long-term monitoring program designed to monitor the status and trends of avian populations in North America, had two routes that traversed portions of GUIS-FL on either end of Santa Rosa Island (U.S. Geological Survey's Patuxent Wildlife Research Center and Canadian Wildlife Service's National Wildlife Research Center 2004). There are also 14 other routes within 30 miles of the park. Christmas Bird Counts, another type of long-term monitoring project, were also conducted on GUIS for several years (National Audubon Society 2004).

General studies

These are general studies of birds in and around GUIS. Corrington (1922) reported on the winter birds of the Biloxi, MS area. Weber (1976, 1983) compared mainland bird populations in De Soto National Forest with populations on the barrier islands of GUIS-MS. He used vegetation analysis, censuses, and behavioral observations to compare community structure and foraging ecology. He discussed physical environments and evolutionary implications. Duncan (1981) discussed changes in bird life in northwest FL between 1965 and 1979. The report includes an annotated bird list for Escambia, Santa Rosa, and Okaloosa Counties.

Waterbirds

General Surveys

A report prepared by Simmons (1978) contains directives for establishing a beached bird survey for GUIS. Simons and Woodrey (1990) prepared a handbook for monitoring shorebirds of GUIS. It includes a baseline inventory and specifically discusses three threatened or endangered species of shorebirds: Snowy Plover (*Charadrius alexandrinus*), Piping Plover, and Gull-billed Tern (*Gelochelidon nilotica*). The report contains species information and discusses monitoring program designs and protocols. Piping Plover surveys were conducted for the International Piping Plover Winter Census during 1991 and 1996 (GUIS 1991; Woodrey 1996). GUIS created a monitoring plan for ground nesting shorebirds (GUIS 1995). The plan includes protection and monitoring protocols. Nicholls (1988a&b) described Piping Plover winter surveys that were conducted along the Gulf Coast from the Florida Keys to Brownsville, including Petit Bois, Horn, East Ship, and West Ship Islands.

Reproduction

Several studies have examined the nesting activities of wading birds and shorebirds in the park. Valentine (1969) reported on a survey of nesting bird colonies on Horn and Petit Bois Islands, MS and Chandeleur Island, LA. The report includes estimates of species composition and population size for each colony. Valentine and Noble (1970) mapped and described a colony of Sandhill Cranes (*Grus canadensis*) in Jackson County MS. They provided detailed physical descriptions of the environment and discussed the range, behavior, and life history of cranes in

the colony. Pridemore (1975) compiled a summary of tern (Subfamily Sterninae) nesting activities and locations on GUIS. The report includes a discussion of protecting tern colonies.

Songbirds

General surveys

Duncan (1988b) summarized sightings of the rare Olive-sided Flycatcher (*Contopus borealis*) in Gulf Breeze and Pensacola, FL.

Habitat use during migration

The barrier islands of GUIS constitute important stopover sites for Neotropical songbirds migrating across the gulf. A considerable research effort has been directed toward studying the use of these islands by migrating birds. Kuenzi (1989) and Kuenzi et al. (1991) studied stopover biology of Neotropical songbirds on East Ship Island, MS. Mist nets were used to capture and recapture birds. Size, body mass change, and arrival and departure dates were determined. Insects were sampled to determine food availability. Moore and Simons (1989) studied the suitability of habitat of East Ship Island, GUIS-MS and Peveto Woods, LA for the stopover of Neotropical migrant songbirds. Insects were sampled from air and vegetation and study site vegetation was described. Birds were captured and recaptured using mist nets and size, weight, and fat score were taken. Duration of stay and physical changes were recorded. Moore et al. (1990) studied spring migratory songbirds stopping on Horn Island. They used point counts across various habitat types to examine abundance, behavior, and mortality sources. Moore (1993) studied habitat utilization of Horn and East Ship Islands, MS by migratory songbirds. Point counts were conducted on transects across different habitat types. Mist nets were used to capture and recapture birds. Fat scores were taken and birds were weighed, measured, and banded. Duration of stopover, body mass change, and energetic condition were determined. Vegetation types were described and flying and non-flying insects were sampled to determine food availability. The author discusses migration, patterns of spring arrival, condition of arrivals, habitat use during stay, stopover duration, physical changes during stopover, fall migration mortality, and suitability of habitat. The report includes management concerns.

Migratory ecology

Moore and Kerlinger (n.d.) studied the benefits of nocturnal migration by songbirds over the Gulf of Mexico. Birds were captured on Dauphin Island and observed in orientation cages. Preferred orientation was observed and fat scores were recorded. Simons and Moore (1992) studied the effect of electromagnetic impulses emitted by EMPRESS II, a U.S. Navy installation, on the migratory patterns of birds in the Gulf of Mexico. Study sites included East Ship and Horn Islands. Caged birds were exposed to electromagnetic pulses and observed for orientation behavior. Body mass changes during stopover were also recorded.

Raptors

Although several important raptor species frequent the park, little study has been conducted on them.

General surveys

Duncan and Duncan (1975) documented hawk migrations for 1972, 1973, and 1974 in Gulf Breeze, FL adjacent to GUIS.

Reproduction

An undated compilation of NPS, GUIS reports contain data about Osprey (*Pandion haliaetus*) nests and nesting activity on Horn Island. Files contain information about locations of nests, chick growth, and telemetry studies.

Bishop (1988) described a Bald Eagle hacking project on Horn Island. Staff involvement and the benefits of the project are discussed. There is also a collection of Bald Eagle observation data for all of GUIS (Author unknown n.d.-b).

Experts: Mark Woodrey, Robert Cooper, Frank Moore

FISH

Fish have been studied in a variety of habitats in and around GUIS. Most of this research has been ecological in nature, examining the habitats, behavior, and interactions of fish communities. Although there have been no large scale fish surveys conducted by GUIS, over 200 species of fish have been documented in the waters on and around GUIS (GUIS 2004). Most of the focus has been on the waters surrounding GUIS. Those species located inland have not been well studied.

Surveys and checklists

Some of the earliest recorded taxonomic studies around GUIS have concerned fish. Jordan (1882) compiled notes on fishes observed around Pensacola, FL and Galveston, Texas and described new species. Jordan (1885) described three new species of fish: the short-winged searobin, bandtail searobin, and the red barbier (*Prionotus stearnsi, P. ophryas, Anthias vivanus*, renamed *Hemanthias vivanus*, respectively) collected in Pensacola by Silas Stearns. Goode (1879) catalogued a collection of fishes from Pensacola and surrounding vicinity. Six new species were described. Jordan (1884, 1886) described three new species, bank butterflyfish (*Chaetodon aya*), black wing flyingfish (*Exocoetus volador*; now *Hirundichthys rondeletii*) and Moustache jawfish (*Gnathypops mystacinus*; now *Opistognathus lonchurus*), from the collection.

There have also been a number of modern surveys and descriptions of fish in and around GUIS. Haburay et al. (1968) compiled a checklist of tropical marine fishes caught in the Pensacola, FL area. There are descriptions of drums (*Sciaenidae*), butterflyfish (*Chaetodonidae*), damselfish (*Pomagentridae*), wrasses (*Labridae*), and surgeon fish (*Acanthuridae*). Jackson (1972) conducted a sport fishing survey of Biloxi Bay and the adjacent Mississippi Sound. Ross (1977) compiled a list of fish collected from the surf zone of Horn Island during 1976 and 1977. Ross (1983) summarized information on the ichthyofauna of the surf zone in the Gulf of Mexico. Among the areas included in this review, he examined the fauna found in the surf zone of Horn Island. He compiled a list of fishes collected and detailed the seasonal and daily variation. As part of a multi-part investigative study, Rakocinski et al. (n.d.-a) studied the biodiversity of fish species located in the north central Gulf of Mexico. From 98 epibenthic samples taken from 12 sample sites on Ship and Horn Islands, MS and Perdido Key, FL they identified 57 species of fish. Discussions included species composition and commercial importance. Beckett et al. (1992) used seining to survey species of bluegills and sunfish (*Lepomis sp.*) in the ponds of Horn Island. Rakocinski et al. (1993b) described the variation and zonation in macrofauna found along the sandy-shore of Perdido Key.

General ecological studies

Marine, estuary, bay

Abundance and distribution

Modde (1980) studied the fish populations occurring in the surf zones of Horn Island. Fish were sampled with seine nets periodically over a 24-hour period at various times during the year. Results concern size, abundance and occurrence, and seasonality. McMichael (1981) and McMichael and Ross (1980, 1987) studied the relative abundance and dietary habits of the gulf (*Menticirrhus littoralis*), southern (*M. americanus*), and northern (*M. saxatilis*) kingfishes in the surf zone of Horn Island. Fish were collected over 24-hour periods throughout the year and stomach contents were analyzed. The seasonal and diel variations and diet of fish were discussed.

Hendon et al. (2000) examined the distribution of larval naked gobies (*Gobiosoma bose*) off the MS coast in the Davis Bayou estuarine ecosystem. They compared disturbed and undisturbed habitat and found some indication that habitat suitability was reduced in the altered habitat.

Ecology

Dawson (1966) studied the gobies (Family Gobiidae) of Mississippi Sound and adjacent waters. Cave (1978) studied predator relationships of the American oyster (*Crassostrea virginica*) and the black drum (*Pogonias cromis*) in Mississippi Sound.

Fournie and Solangi (1980) conducted a study on the longnose killifish (*Fundulus similis*) from Horn Island to determine prevalence of protozoan parasite, *Eimeria funduli*. Modde and Ross (1981) studied seasonal variations in fish occurring in the surf zone of Horn Island, MS. The authors sampled six times over a 24-hour period once a month during the study period. The

results concern seasonal variations in occurrence, daily activity patterns, species composition, and factors that affect occurrence. They found more fish in the surf zone seasonally from late summer to fall and daily from 0300 to 0900 h CST. Ross et al. (1987) studied the daily behavior of fish and macroinvertebrates in the surf zone of Horn Island, MS. Samples were collected by seine six to eight times daily at designated sampling stations at different times of the year. A variety of environmental data was also collected. Switzer (1996) conducted a study on the colonization of artificial seagrass off of Horn Island. He examined how the habitat modification would affect crabs and fish. Ewing (2000) conducted a study on the silversides (*Menidia* sp.) in the tidal waters of Horn Island. He discussed the morphology, habitat use and the unisexual and bisexual demographics of the population.

Diets

Overstreet and Heard (1978a&b) studied the diets of Atlantic croaker (*Micropogonias undulatus*) and red drum (*Sciaenops ocellata*) in Mississippi Sound. Stomach contents were analyzed from fish captured in trammel nets. In 1982 the same authors analyzed the stomach contents of six species of commercially important fish from Mississippi Sound (Overstreet and Heard 1982). Fish were collected by trammel net. Results list food items and percent occurrence of fish species. Steen and Laroche (1983) studied the dietary habits of larval and juvenile red drum in Mississippi Sound and the Northern Gulf of Mexico. The authors collected fish by seine and dissected the gastrointestinal tracts to identify contents. They found that copepods and crustacean nauplii were the dominant food items eaten by the red drum.

Modde and Ross (1983) studied trophic relationships between Florida pompano (*Trachinotus carolinus*), gulf kingfish, scaled sardine (*Harengula jaguana*), striped anchovy (*Anchoa hepsetus*), and dusky anchovy (*A. lyolepis*) on Horn Island. Fish were sampled from the surf zone by bag seine once monthly for 24 months. The stomach contents were analyzed and results were presented by species. They also found that summer resident species could be divided into two groups based on behavior; individuals that use the surf zone as a feeding and perhaps shelter area and those that used it primarily for shelter.

VanderKooy et al. (2000) examined the relationship of prey abundance and feeding habits of three sunfish in an estuarine bayou. They found that differences in trophic levels were based more on prey type then feeding habitat.

Contamination/disease

Limited studies have examined contamination and diseases of fish on GUIS. Christmas and Howse (1970) studied the occurrence of lymphocystis in the Atlantic croaker and sand seatrout (*Cynoscion arenarius*) of Mississippi Sound. Affected fish collected from monthly seining samples were measured and described. A variety of hydrological data were also collected from sample sites. Tagatz et al. (1974) studied the effects of malathion pesticide application on three salt marsh species of Santa Rosa Island. They examined the effects on caged blue crabs (*Callinectes sapidus*), grass shrimp (*Palaemonetes* sp), and sheepshead minnows (*Cyprinodon variegatus*).

In an effort to define species that can be used as bioindicators of environmental health, Oliveira (1991) examined three species of fish, southern toadfish (*Opsanus beta*), hardhead catfish (*Arius felis*) and the sheepshead minnow. Liver, kidney and gill tissues samples were collected from pristine sites (Horn Island and Fort Bayou) and contaminated sites (Bayou Casotte and Pascagoula City Harbor) and examined for histopathological markers.

Tide pools and inland waters

Franks (1968, 1970) conducted surveys of the fish populations of the inland waters of Horn Island. The report includes a variety of data about specimens such as size, abundance, location, habitat, life history, and stomach contents and discusses the general ecology of the waterbodies studied. It also includes detailed descriptions of the physical environment and some hydrological data. Modde (1979) characterized the ichthyofauna of Horn Island. Ruple (1984) conducted a survey of larval fish on Horn Island. Fish were netted at established sampling stations monthly and at varying times of day. He discussed habitat, community composition, abundance, seasonal variations, spawning, and diet. Doherty (1987) and Ross and Doherty (1994) studied fish assemblages of tide pools on Horn Island. They used seining to sample pools four times during the year. Species were identified and measured and subsamples were used to study biomass and stomach contents. The results include discussions of assemblage structure, life history, environmental interactions, and trophic structure. The area and volume of the pools was estimated and a wide variety of physical and hydrological data was collected. Boyd et al. (1994, 1995) reported on the fauna of brackish and freshwater ponds of the islands of GUIS. The report includes observations on fish behavior and the occurrence of parasites of invertebrates and vertebrates. Fish stomach content analysis was conducted as well as chemical analyses.

Experts: Stephen Ross

INVERTEBRATES

Invertebrates have been extensively studied in the park. Much of the research has focused on aquatic macroinvertebrates and many examinations of invertebrates have been conducted incidentally as part of other studies.

Terrestrial

Surveys and checklists

Limited research has been performed on terrestrial invertebrates of GUIS. Rings and Richmond (1953) conducted a mosquito survey of Horn Island. Mather (1971) compiled a list of insects found on the Gulf Coast and barrier islands of MS. Guarisco (1993, 1995) conducted several surveys of the spiders found within the Forth Pickens and Live Oak areas of GUIS-FL. Reports include a species list and a description of the habitats where they are found. As part of songbird migration stopover study, Kuenzi (1989) and Kuenzi et al. (1991) collected flying and non-flying

insects on East Ship Island. Moore (1993) also sampled flying and nonflying insects as part of a songbird migration study on Horn and East Ship Islands.

Individual species studies

Guarisco (1989) studied the ecology of the Gulf Coast White Wolf Spider (*Arctosa sanctaerosa*) at the Fort Pickens and Santa Rosa areas of GUIS. Aspects of life history and behavior are discussed. Cane (1993) discovered and Snelling formally described a new species of monolectic coastal bee (*Hesperapis oraria*) occurring on Santa Rosa Island. Cane et al. (1997) discussed distribution, ecology, behavior, and host species, the coastal plain honeycombhead (*Balduina angustifolia*). A 1995 correspondence between Kate Kelley and Riley Hoggard addressed the preservation of the tiger beetle (*Cicindela dorsalis saulcyi*) on GUIS (Kelley 1995).
Aquatic

Benthic invertebrates

General surveys, checklists

Stoner et al. (1983) compared two methods of macrobenthic sampling in Pensacola Bay. The authors concluded that the hand held core sampling method provided more reliable data for density estimation than the suction sampling method. A list of macrobenthic fauna is included.

Rakocinski et al. (1993b) and Rakocinski and Lecroy (1995) conducted a comprehensive survey of benthic macroinvertebrates of GUIS. They used a variety of sampling methods to gather data from exposed and protected beaches, seagrass beds, and lagoons on each of the islands. Physical, environmental, meteorological, and hydrological data were collected at sampling sites. Rakocinski et al. (1998) used this data along with historic data collected in 1986-87 and compared spatial and temporal macrobenthic assemblages along the GUIS coast. They described the variations detected between both surveys as well as between seasons and across locations.

McLelland and Gaston (1994) described the discovery of two new paranoid polychaetes species, *Cirrophorus perdidoensis* and *C. perkinsi*, off Perdido Key.

Ecology

Franks et al. (1972) examined the influence of physical, chemical, and geological parameters on nektonic and benthic fauna in the Gulf of Mexico off the MS coast.

Sherrard (1983a&b) analyzed benthic macroinvertebrate assemblages in various habitat types in Ranger Lagoon, Horn Island. Results concern habitats, geomorphology, hydrology, community structure, and biodiversity. Sherrard identified 109 taxa (in 10 phyla), a majority of which were polychaetes and crustaceans. Of the five microhabitats found on the island, the silt microhabitat had the lowest species diversity while grassbeds had the highest. Viskup (1995) compared macroinvertebrate assemblages in fresh and brackish ponds on Horn Island.

Distribution

Boschung and Gunter (1962) studied the distribution and variations of the Caribbean lancelet (*Branchiostoma caribaeum*) in Mississippi Sound.

Anthropogenic effects

Heard et al. (1996) analyzed the effect on the macroinvertebrate community of a coal spill in an old bay channel off Santa Rosa Island near Fort Pickens. The study includes hydrographic and geologic data about the spill site and a list of species.

Plankton studies

General surveys, checklists

Perry and Christmas (1973) conducted a survey of the zooplankton of Mississippi Sound. The report discusses abundance, distribution, and seasonal variations.

Ecology

Mulkana (1967, 1968) examined seasonal changes in the standing crop of plankton in Mississippi Sound. Mulkana and McIlwain (1973) studied the abundance and seasonal variation of the predatory marine arrow worms (Phylum Chaetognatha) in MS. Samples were collected monthly from a single station and seasonal abundance was determined. Mulkana and Abbot (1973) studied the nutritional components of plankton in Mississippi Sound. Samples were taken monthly at established stations and plankton was analyzed for protein, carbohydrates, lipids, calories, and ash. Discussion focused on seasonal variations. Anderson (1968) studied the ecology of foraminifera species from Mississippi Sound and adjacent waters. Felder (1975) conducted a study off the north-western tip of Horn Island on planktonic diatoms. Sullivan (1979) studied the epiphytic diatoms of shoal grass, turtle grass, and manatee grass of Mississippi Sound. He found that the diatom community was comprised of 45 taxa and it was nearly homogenous between the three seagrass species. McLellend (1987) studied phytoplankton productivity and community dynamics in Ocean Springs Harbor. Sullivan and Wear (1995) described the morphology of two giant diatoms (*Ardissonea formosa* and *Synedra bacillaris*) collected from seagrass at Perdido Key.

Crustaceans

Ecology

Christmas et al. (1966) studied seasonal variations and abundance of penaeid shrimp in Mississippi Sound. Shrimp were sampled with trawl nets on a semi-weekly basis at established stations. A variety of physical and meteorological data were also collected. Bauer and Lin (1994) conducted a study on the seasonal variation in reproduction and recruitment of two penaeid shrimp species, *Trachypenaeus similis* and *T. constrictus*, off the coast of Horn Island in the Mississippi Sound. The development of mature female reproductive organs peaked in July to

September while mature males existed throughout the year. Recruitment also showed no seasonal patterns.

McIlwain (1966) conducted a survey of pelagic copepods off Horn Island in the Mississippi Sound. In 1968 the same author studied seasonal variations in pelagic copepods in Mississippi Sound (McIlwain 1968). He collected samples to determine the seasonal abundance at a designated site once a month for 15 months. Nicholson (1970, 1971) studied marine harpacticoid copepods of the sandy beaches of Horn Island.

Phillip (1971) studied the ecology of mudshrimps (*Callianasa sp.*) in Mississippi Sound. Specimens were sampled throughout the Sound with the number, species, and gonadal conditions of females recorded. Burrow openings were observed in the field. Stomach contents were recorded and shrimp were observed in aquaria for reactions to various substrates. Some environmental data concerning study sites were recorded.

Cake (1983) studied symbiotic associations of the southern oyster drill (*Thais haemastoma floridana*) with blue crabs and thinstrip hermit crabs (*Clibanarius vittatus*) on Horn and Ship Islands. The organisms were observed on location and were also captured and used in aquaria studies. Incidence of infestation, and behavioral interactions were discussed.

Bruce (1989) studied the invertebrates associated with the thinstrip hermit crab on Horn and East Ship Islands. Organisms were sampled from crabs taken from selected beaches. She discussed the type of symbionts, type of gastropod shell, and number of crabs infected. Switzer (1996) conducted a study on the colonization of artificial seagrass off of Horn Island. He examined how the habitat modification would affect crabs and fish.

Anthropogenic effects

Tagatz et al. (1974) studied the effects of malathion pesticide application on caged blue crabs, grass shrimp, and sheepshead minnows in the salt marsh of Santa Rosa Island.

Mollusks

General surveys, checklists

Vanatta (1903) compiled a list of mollusks collected in Western FL and Horn Island. Moore (1961) reported on the marine and brackish water Mollusca off the coast of MS. The survey includes a list of species occurring in Mississippi Sound and adjacent waters. Over 160 species have been documented in the Mississippi Sound (GUIS 2004).

Ecology

Significant research on GUIS has involved oysters. Moore (1913) reported on the condition and extent of barren bottoms and oyster beds in coastal MS and AL east of Biloxi, MS. Cave (1978) studied predator relationships of the American oyster and the black drum in Mississippi Sound. McGraw (1980) studied the growth and survival of seed oysters from hatchery and wild stock in

Mississippi Sound and adjacent waters. Cake (1982) reviewed the status of oyster populations in the barrier island lagoons of GUIS and prepared a report which discusses life history and management issues. Hase (1982) conducted a study concerning increasing the oyster productivity of lagoons on Horn Island. The study compared three substrates to determine which was most preferred as attachments for oysters. In another experiment, the study examined hatchery reared oyster survival on various substrates in both protected and unprotected conditions. Growth rates were compared for the lagoon, Biloxi Bay, and Mississippi Sound.

A few other studies have examined other mollusk species from GUIS. Chapman (1958) studied oyster drill (*Thais haemastoma*) predation in Mississippi Sound. Cake (1983) studied symbiotic associations of the southern oyster drill with blue crabs and thinstrip hermit crabs on Horn and Ship Islands, GUIS-MS. The organisms were observed on location and were also captured and used in aquaria studies. Incidence of infestation and behavioral interactions were discussed. Cleveland (1992) conducted a study on the life history of *Goniocuna dalli* (Bivalvia, Crassatellidae) near West Ship Island. Walker (1998) conducted a population study of *Melongena corona* Gmelin on Perdido Key. In a continuing study, Walker (2003) examined the macroinvertebrate community of Perdido Key again after Hurricane George (2003). She found that two mollusk species, *M. c. johnstonei* and the olive nerite (*Neritina reclivata*), were extirpated from the area and four species, not present on the key prior to the hurricane were found in its wake. Additionally, Walker used morphometric and DNA analyses and determined the *M. c. johnstonei* subspecies along the Gulf Coast and Western Atlantic shores were not warranted and should be grouped into a single species.

Distribution

Miller and Kooser (1982) studied the distribution of variable coquina (*Donax variables*) at Ship Island, GUIS-MS.

Other aquatic invertebrates

General surveys, checklists

Heard and Stuck (1987, 1989) conducted a comprehensive multipart study examining the macroinvertebrate fauna of the swash and subtidal zones of Ship and Horn Islands, MS and Perdido Key, FL. The study was designed to identify indicator species and provide a baseline for further monitoring and management. Qualitative and quantitative sampling was performed at established stations.

Young et al. (1987) characterized the physiochemical properties and macroinvertebrate populations of Santa Rosa Sound. The study was designed to update the knowledge of the Sound's ecosystem.

As part of a multi-part investigative study, Rakocinski et al. (n.d.-b) examined associations of invertebrate macrofauna found on barrier islands in the north central Gulf of Mexico. The authors took 558 box cores from six sample sites on Ship and Horn Islands, MS and Perdido Key, FL. They identified dominant invertebrate species for northern Gulf of Mexico, explained

the associations they form, and described the environmental factors influencing organizational patterns among macrofauna. In another division of the study, the authors concentrated on the biodiversity of benthic fish and invertebrates collected at 12 sample sites on the islands mentioned above. From 98 samples they identified 57 species of fish and over 200 species of invertebrates and their planktonic forms.
Rakocinski et al. (1991a, 1990a) studied macroinvertebrate assemblages on the beaches of three islands on GUIS. The results concern biodiversity and environmental correlations.

Boyd et al. (1994, 1995) reported on the fauna of brackish and freshwater ponds of the islands of GUIS. The report includes observations on fish behavior and on the occurrence of parasites of invertebrates and vertebrates. Chemical analyses are also included.

Ecology

Burke (1975) studied the occurrence and seasonal abundance of pelagic Cnidaria in Mississippi Sound and adjacent waters. Samples were collected regularly by plankton and trawl nets, and by dredging. Results showed habitat and seasonal abundance of organisms.

Morris (1983) conducted a study on the population characteristics and symbiotic associations of *Chrysaora quinquecirrha*, a sea nettle medusa, in the Mississippi Sound. He found the inshore abundances peaked in July while offshore peaked in July and August. Over 70 percent of the individuals sampled had some form of brachyuran symbiont, including *Libinia dubia*, *Callinectes sapidus*, *C. similis*, *Portunus gibbesii*, and *Pinnixa* sp. He also found that the relationship between the sea nettle and the crab changed as the crab developed, starting with commensalism, to facultative parasitism, and finally to predation.

As part of a larger geological study, Otvos (1982b) analyzed core samples from Santa Rosa Island for microfauna assemblages. Gibson (1994) analyzed Foraminifera species in a 510 foot deep core sample taken on Horn Island. He used his findings to hypothesize about historical environmental conditions.

Ross et al. (1987) studied the daily behavior of fish and macroinvertebrates in the surf zone of Horn Island. Samples were collected by seine six to eight times daily at designated sampling stations at different times of the year.

Distribution

Rakocinski et al. (1993b) described the variation and zonation in macrofauna found along the sandy-shore of Perdido Key.

Anthropogenic effects

Heard and McLelland (1990) and McLelland and Heard (1991) studied the effect of a September 1989 oil spill at the mouth of the Pascagoula River on the invertebrate populations of Horn Island. The study concluded that crustacean populations declined while polychaete and

oligochaete densities increased. The study included sampling sediments for hydrocarbon residues.

A series of monitoring reports by Rakocinski et al. (1990b, 1991b, 1992, 1993a, 1994) studied the effects of beach nourishment at Perdido Key upon the macroinvertebrate communities of the beach. The study covered the area of nourishment from the beach to 800 meters seaward from the original beach location. They concluded that recovery rate, species diversity, distribution, and community composition of macroinvertebrate fauna were adversely affected following the project and were continuing to recover at the time of the final report.

Experts: Terrestrial: Hank Guarisco (spiders) and Mark LaSalle (general);
Aquatic: Chet Rakocinski, Richard Heard and Jerry Mclelland

PHYSICAL RESOURCES

GEOLOGY

The northern Gulf of Mexico region that contains GUIS is geologically dynamic and has been the focus of much research. Petroleum research and development is a major influence on the waters offshore of the park, but is not included in this summary. Geological research for GUIS has focused on island geomorphology and sediment studies.

Wide scale geology studies

Various studies place GUIS in a wider geological context. The studies in this section concern the geology of the Gulf Coast area that includes the park. Boone (1973) studied the depositional systems of the AL, MS, and Northwest FL barrier coast. Price (1975) studied the growth of gulf beach in western FL. Kent (1976) studied the coastal sedimentary environments of Northwest FL and AL. Otvos (1976a) studied the post-Miocene development of AL and MS coastal zones. Otvos (1976b) conducted a broad study of the geology of Mississippi Sound which included the subsurface geology and exploration, sediments, bathymetry, dredge spoil areas, oyster reefs, and shoreline changes. Otvos (1979) discussed barrier island evolution and migration for the north central Gulf of Mexico. Otvos (1981) reviewed the evidence supporting theories of barrier island formation through near shore aggradation by studying formation of the Mississippi Sound barrier islands. Otvos (1982a) studied coastal energy relationships along the barrier islands of MS. Nummedal (1982, 1983) discussed the geology and the storm response of the barrier islands on the northern coast of the Gulf of Mexico including the Mississippi Sound. He found that the oldest islands were about 4000 years old but many of the Mississippi delta barriers were much younger. The extent of hurricane impact varied according to topography (low-profile large amounts of damage; high-profile less damage) that in turn varied according to their stratigraphic evolution. In an appendix of a dredged material disposal study, Ryan and Kelly (1984) broadly described the physiography, hydrology, and air dynamics of the Gulf coast from West FL to MS. Descriptions include all physical aspects of the coast such as wetlands, barrier islands, and beaches. Shabica et al. (1984) studied erosion and accretion rates for the barrier islands of LA, MS, and AL. Aerial photographs and USGS quadrangles were compared to determine erosion and accretion rates. The authors determined that MS and AL islands showed slower erosion rates than islands of LA. Dauphin Island, AL, Chandeleur Islands, LA and Cat Island, MS exhibited high erosion rates from overwash while the other islands did not. Stone (1991) discussed the differential sediment supply and cellular nature of the northwest FL and southeastern AL coast during the late quaternary period. Caputo and Oivanki (1992) studied low-order morpho-sedimentary changes on barrier islands of the MS Gulf Coast. Douglass and Haubner (1992), and Douglass (1994) collected a variety of data to record erosion and accretion on Dauphin Island, AL adjacent to GUIS. Oivanki (1994) conducted a study of the geomorphology of the MS Coast barrier islands examining natural and human related changes. Physical features were mapped and classified.

Geomorphology of the park

Mississippi section

Extensive study has focused on the physical shape and changes of the coastlines of GUIS. These studies discuss the geomorphology research conducted in the MS portion of GUIS. Research has examined natural, long-term geophysical changes and sudden changes caused by storms and human actions. Zapel (1983a, 1984), in an effort to examine the westward migration of barrier islands in the Gulf of Mexico, studied the morphology, sedimentary structures, and sediment dispersal patterns of a transverse bar field of Horn Island. Using a sediment dispersal model, she found that northerly wave approaches produced a circulation pattern that maintained the bar morphology. Easterly wave approaches, caused by strong frontal passages, may cause the westward migration and asymmetrical shape of the bars. Rucker and Snowden (1989) studied the beach ridges of Cat Island and they analyzed aerial photographs and conducted comparative field surveys and vegetation surveys. Their report includes a physical description and a geological history of the island. Waller and Malbrough (1976) and Malbrough and Waller (1977) studied shoreline changes to the MS barrier islands of GUIS. The authors compared maps and aerial photographs. Shabica et al. (1978) examined littoral drift and nearby shipping channels of Petit Bois Island, MS. The authors compared maps and photographs from 1856 to 1976 to show shoreline changes. There is a discussion of the physical forces affecting barrier islands. The report suggests that Petit Bois Island faces eventual "extirpation." Nummedal et al. (1980) studied bar morphology along the Mississippi Sound margin. Dolan et al. (1982) studied beach morphology and nearshore bathymetry around Horn Island. A variety of data were collected from 217 sites. Byrnes et al. (1991) studied historical shoreline changes for Cat, East and West Ship, Horn, and Petit Bois Islands, MS by comparing maps and photographs from 1847 and 1986. Reports by Chaney (1993) and Chaney and Stone (1995, 1996) concerning erosion control activities on West Ship Island, MS described the littoral drift processes affecting the island and discussed shoreline erosion. Stone and Morgan (1993) analyzed rates of beach erosion near Fort Massachusetts on Ship Island. They produced a graph of erosion rates at various monitoring stations. Oivanki and Yassin (1994) studied the historical shoreline changes of MS barrier islands since 1850 by comparing photographs and maps. As part of an investigation to study sand resources available for beach nourishment on West Ship Island, Oivanki (1995) concluded from historical investigation that more than 640 acres had been lost to erosion since the 1850s. The erosion was worst on the south shore of the island and was negatively impacted by piles of rock and concrete around the Ship Island Lighthouse. Schmid (2001) examined the morphology and evolution of West Ship Island and documented its response to Hurricane Georges (1998). He used LIDAR, Global Positioning Systems surveys, cross-shore profiles, aerial photography, sediment cores, and bathymetry to examine the changes in the island.

These studies examined more sudden changes in shoreline morphology. Henry (1976) coordinated study and compiled data concerning the effect of hurricane Camille and the effects of subsequent nourishment on shorelines of West Ship Island. In the final report he compared aerial photographs and used bathymetric measurements to discuss the rate of erosion for the nourished beach (Henry 1977). He described the physical environment and discussed the history of shoreline changes. Shabica and Shabica (1979) and Shabica (1982b) studied human related

shoreline changes for Petit Bois Island. Stone et al. (1998c), as part of a multi-part study, examined morphological changes to the beach profile of the north shore of West Ship Island resulting form cold front weather patterns. Monitoring occurred during 12 months beginning in June, 1996. Also included is a discussion of south side beach changes resulting from Hurricane Danny.

Florida section

The MS and the FL sections of GUIS are geographically distinct and their geomorphology has been studied separately. Vieser et al. (1977) conducted a beach profile study of Santa Rosa Island. Chang (1978) conducted a study on the littoral drift along the bayshore of Santa Rosa Island. Coling (1980, 1981, 1986) assessed the physical changes to Perdido Key resulting from Hurricane Frederic in 1979 and other storms. The report includes a discussion of historical conditions and includes recommendations for managing Perdido Key. Stone (1984) studied and analyzed the effect of various physical forces on shorelines of the barrier islands of Northwest FL, focusing particularly on Santa Rosa and Perdido Key. He described sea level changes and constructed a chronology of events for the two islands. He quantified shoreline changes and discussed wave action and sediment transport. Stone and Salmon (1988) discussed the morphodynamics relating to hurricanes on Perdido Key. Balsillie (1986) studied long term shoreline change rates for Escambia County, FL. Jagger (1989) studied the relationship between wave energy and beach formations on Perdido Key. Psuty and Jagger (1990, 1987, 1989) and Psuty et al. (n.d.) prepared reports on shoreline changes on the Gulf side of Perdido Key between two beach nourishment projects in 1985 and 1989. They discussed historical changes and factors influencing shoreline morphology and analyzed historical data. Using data concerning nourishment projects and several hurricanes they concluded that amount, distribution, and elevation of beach material greatly influence shoreline movements. They estimated that the island is migrating westward at a rate of 1.7 feet per year and losing 200,000 cubic yards of sand yearly. Stone (1996) and Stone et al. (1996) studied the morphological changes to the shoreline of Santa Rosa Island caused by Hurricanes Erin and Opal in 1995. Previously established transects were used to measure the morphology of beaches and dunes and to compare it to pre-hurricane morphology. A separate part of the study by Stone et al. (1998b) examined beach profile changes on the north shore of Santa Rosa Island resulting from cold front weather patterns. The monitoring occurred between December 1994 and May 1995. Results indicated that southerly and easterly wind currents heavily impacted beach movement by increasing tide water levels. Northerly and westerly winds were found to decrease tide effects in the Pensacola Bay area. Bayside beaches eroded 0.7 meters during the 21-week monitoring period and annual erosion was calculated to be 1.8 meters.

Stratigraphy and sediments

Mississippi section

Marion (1951) studied the recent marine sediments of the Biloxi and Ocean Springs area. Priddy et al. (1955) conducted a comprehensive study of the sediments of Mississippi Sound. Sediments were sampled throughout the sound and analyzed for numerous physical, biological, and chemical parameters. The authors discussed the sedimentary processes and the oyster beds

of the sound. Rainwater (1963) surveyed the underlying geology of Mississippi Sound between Beauvoir, MS and Ship Island. Core samples were collected and analyzed between these points. As part of a comprehensive study of the Mississippi Sound estuarine system, Christmas (1973) reported on sedimentology in the sound. Lanigan (1979) conducted a study on the heavy minerals found in Mississippi Sound and Petit Bois Island. In an appendix to the General Design Memorandum, the U.S. Army Corps of Engineers discussed the origin and composition of sediments between Gulfport and Ship Island, MS (Author unknown 1988).

Smith (1958) examined the foraminiferal ecology of the sediments near Horn Island. The Tenth Annual Meeting of the Gulf Coast Association of Geological Societies conducted field trips to Horn Island and examined the sedimentation and stratigraphy (Gulf Coast Association of Geological Societies 1960). Priddy and Smith (1964) studied recent sedimentation on Horn Island. Cooke (1981) conducted a study on the sedimentary environment of Horn Island. Zapel and Nummedal (1983) studied the physical sedimentary processes of GUIS. Zapel (1983b) studied the morphology, sedimentary structures, and sediment dispersal patterns of sandbars along the north side of Horn Island. Bathymetric profiles were regularly surveyed. Core samples were analyzed for sediment texture and grain size. Sediment movement was monitored using fluorescent tracer sands. Dixon (1990) conducted a study that examined the accumulation of heavy minerals on Horn Island. McLelland and Heard (1991) studied the effect of an oil spill on the macroinvertebrate populations of a lagoon on Horn Island. The study included sampling sediments for hydrocarbon residues. As part of a study of the Neogene and Quaternary geology of the MS Coast, Gohn et al. (1996) examined one of two stratigraphic test holes excavated on Horn Island. They discussed the sedimentation and sequence records and discussed the likely sources.

Rowland (1997) examined the nearshore of MS (including Ship, Horn and Petit Bois Islands) to determine the mechanisms of deposit formation and the potential for these deposits to contain heavy minerals. Chaney (1999) examined the severe shoreline erosion occurring on the northern estuarine shores of West Ship Island during storm events. He examined the wind, weather, and oceanographic data and found the tides affected the predominant direction of sediment transport.

McAuliffe (1980) attempted to show how interactions between fluvial and marine processes affected the formation of Pleistocene sedimentary deposits on coastal Harrison County, MS. She included numerous visual aids and other data to trace the changes from the Pleistocene to the present.

Florida section

Horvath (1968) studied the sedimentology of Pensacola Bay systems. Van Wyk (1973) studied Holocene sedimentation history for the area around Pensacola, FL. Land features were studied by trenching and collecting soil samples. Grab samples and box core samples were collected from underwater transects. Samples were examined for texture and composition. The report discusses the geological setting and the depositional environments of the area.

Parker (1968a&b) conducted a sediment study of Perdido Bay and adjacent offshore areas.

Otvos (1982b) studied the origins and formation of Santa Rosa Island. Core samples were taken and analyzed for grain size, sediment texture, and microfauna assemblages. The report discusses the evolution and stratigraphy of the island. Webb (1985) conducted thesis research on depositional subenvironments of Santa Rosa Island.

Soils and minerals

There has been relatively little study directed toward mineral and soil science for GUIS. Some of the significant work has been in areas adjacent to the park. Milne and Shett (1956) studied the clay mineralogy of recent sediments in Mississippi Sound. Foxworth et al. (1962) studied the heavy minerals found in the sand of recent MS coast beaches. The study area and the heavy minerals in question are physically described. The transport, deposition, and concentration of heavy minerals are discussed. Hahn (1962) studied the occurrence of titanium in the sand of Ship Island. Core and hand samples were analyzed. The report includes a review of the geology and physical features of the island. The U.S. Department of Agriculture, Soil Conservation Service conducted soil surveys of some of the counties containing GUIS: Jackson, MS (1964); Harrison, MS (1975); Santa Rosa, FL (Weeks et al. 1980). Reports describe soil types, show their locations, and discuss their response to physical forces. Harrison (1968, 1973) studied the heavy minerals of Horn Island. Shabica and Watkins (1980) and Shabica (1981) analyzed the soil used for road fill in the Fort Pickens area of GUIS. Zimmerman (1990b) analyzed the sand of Horn Island beaches for hydrocarbons to study the effects of an oil spill. Gohn et al. (1994) described soil types found in a 510 foot core sample taken from Horn Island.

General studies

This section contains general geological studies. Marsh (1966) reported on the geology of Escambia and Santa Rosa Counties, FL. A report by the University of Florida's Coastal and Oceanographic Engineering Laboratory (1973) discussed the geology of the Navarre Pass area. The University of Georgia's Marine Institute and Skidaway Institute of Oceanography (1973) compiled a summary of information on the geology of GUIS. Rinkel and Jones (1973), as part of a larger study, investigated physical and geological parameters of coastal areas of Escambia and Santa Rosa Counties. Shabica (1982a) compiled a summary of proposed and ongoing geological and geographical research on GUIS. The summary describes each study and notes its current status and expected duration. McBride et al. (1991) studied the geology of Petit Bois Pass between Dauphin Island, AL and Petit Bois Island. The study involved core sampling, seismic data, and examining various historical records and maps. Results concern morphic changes, geologic framework, and the location of the occurrence on mineral resources. Morgan (1992) reported on radiocarbon dating performed on samples of a juniper stump and a peat sample from a peat outcrop in the Fort Pickens area of GUIS. Results indicated the peat bog's age to be 850 years (+ or – 50 years) prior to the sample date. It was calculated that island turnover rate was 1.2 inches yearly and that sea level rise was 0.008 inches yearly. A report by Heard et al. (1996) analyzing the effect on the macroinvertebrate community of a coal spill in an old bay channel off Fort Pickens discussed the geology of the spill site. Gathen (1994) analyzed the ecological impact of historic and prehistoric hurricanes on Horn Island. The study includes physical descriptions of the study area and describes geological effects of hurricanes on barrier islands.

Experts: Gregory Stone, Stephen Shabica and Stephen Oivanki

HYDROLOGY

Most of the hydrology research for GUIS has concerned the surface water of the park and surrounding areas. The sounds, bays, ponds, and lagoons of the park have all received study. Much of the data collection has occurred incidentally with accompanying biological or ecological research.

General

In the only study to examine both surface and groundwater, Musgrove et al. (1965, 1966) surveyed the water resources of Escambia and Santa Rosa Counties, FL. Geology, surface and groundwater, water use, potential supplies, and water problems are discussed. The included data tables show stream flows, stream chemical analyses, conductance, temperature, aquifer chemical analyses, well studies, and groundwater levels.

Groundwater

The study of groundwater resources for GUIS has been very limited. Wright (1983) discussed the freshwater resources available to the Mississippi Gulf Coast and GUIS-MS. The combination of increased demand and the unilateral use of one narrow zone of ground water were creating a severe reduction in water levels and salt-water intrusion was anticipated. He suggested the use of numerous rivers and streams located in the area or deeper thicker aquifers that were not currently tapped due to fears of contamination or economic reasons. Two studies examined groundwater near Fort Pickens. Bortone and White (1996) reported on the water quality of wells in Fort Pickens. They found most wells met Florida state quality requirements for drinking water. However, two wells exhibited high levels of total dissolved solids and several wells had high levels of enterococci and fecal coliforms. Debusk (1998) reported on a one year study of the impact of a septic system leachfield near Fort Pickens upon the groundwater and surrounding surface water. Bacterial and nutrient contamination was tested and evaluated in nearby Pensacola Bay waters.

Surface water

General

The surface water hydrology of GUIS was been studied extensively and can be considered by the type of water involved. A number of general studies have been conducted in the area, many of which were larger in scope but have hydrologic components. A fish survey by Franks (1968, 1970) included detailed descriptions of the physical environment and some hydrological data. Slack (1972) analyzed various chemical parameters from the water of rivers and streams in Escambia and Santa Rosa Counties, FL between 1968 and 1972. A study of the coastal processes of Navarre Pass, FL, by the University of Florida's Coastal and Oceanographic Engineering Laboratory (1973) contains information on the hydrology for the area. A document compiled by Stewart (1992a) contains water temperature, pH, and salinity readings July 1991

through May 1992 for Fort Pickens, Perdido Key, and Santa Rosa sampling stations. Gathen (1994) analyzed hurricane impacts on Horn Island and includes hydrological data. As part of a comprehensive survey of the benthic macroinvertebrates of GUIS, Rakocinski and Lecroy (1995) collected hydrological data from beaches, seagrass beds, and lagoons on all GUIS islands. Data includes temperature, salinity, D.O., and pH. Debusk (1998) reported on a one year study of the impact of a septic system leachfield near Fort Pickens, GUIS-FL upon the groundwater and surrounding surface water. Bacterial and nutrient contamination was tested and evaluated in nearby Pensacola Bay waters. A collection of NPS water quality data sheets for the years 1994 to 1996 shows hydrological data from West Ship and Horn Island (NPS 1996). Rakocinski et al. (1997) examined the effect of natural and contaminant-related gradients on macrobenthic communities. When controlling for natural gradients such as salinity, depth and sediment composition they found that trophic diversity decreased with sediment contamination. During a similar study in the Gulf of Mexico, Brown et al. (2000) again found the macrobenthic trophic diversity decreased and suggested that the benthic trophic structure could be used to assess toxicological responses at the community level.

Water quality data for surface water in FL and MS, including the Gulf Coast region, has been monitored by Florida Department of Environmental Protection (FDEP) and Mississippi Department of Environmental Quality (MDEQ). To comply with Section 303(d) of the Clean Water Act, states are required to compile a list of impaired waters every two years. Mississippi has just approved the 2002 list which contained one waterbody on GUIS-MS and the 1998 Florida state list contained three waterbodies in the GUIS-FL region (Table 1).

Table 1. Waterbodies within GUIS listed on the Florida state 1998 and Mississippi state 2002 303(d) list, which denotes waterbodies that do not meet the standards set for their use.

Waterway	Overall rank	Concern
Mississippi Sound	unknown	arsenic, pH, toxics, organic enrichment, low D.O., metals
Big Lagoon	low	Dissolved Oxygen
Pensacola Bay	high	Copper, Lead, Biochemical Oxygen Demand, Nutrients, Turbidity, Total Suspended Solids, Coliforms
Choctawhatchee Bay	high	Biochemical Oxygen Demand, Coliforms, Nutrients, Turbidity, Total Suspended Solids, Mercury (Based on Fish Consumption Advisory)

Mississippi Sound

This research concerns the hydrology of Mississippi Sound. The physical and biological aspects of the sound have been extensively studied. As part of a study involving penaeid shrimp in Mississippi Sound, Christmas et al. (1966) measured sea temperature, salinity, turbidity, tide, and sea state. As part of a larger fish study, Christmas and Howse (1970) recorded temperature, salinity, D.O., pH, phosphate, and nitrate from sampling sites in Mississippi Sound. McPhearson (1970) studied the hydrology of Mississippi Sound and Mobile Bay and as part of a study examining aquatic vegetation in the Sound, Eleuterius (1971) sampled salinity and turbidity. A study of *Chaetognatha* abundance in Mississippi Sound by Mulkana and McIlwain (1973)

included measurements of water temperature, salinity, and transparency at a sampling station in the sound. In a comprehensive study of the estuarine system of Mississippi Sound, Christmas (1973) included hydrology data. As part of a study of pelagic cnidaria in Mississippi Sound, Burke (1975) recorded temperature, salinity, turbidity, D.O., and pH of waters at established sampling stations. Eleuterius (1976), in one of the few research efforts directed solely at hydrology, conducted a hydrological study focusing on the Sound's salinity and tidal currents. He measured a variety of hydrological parameters including: salinity, conductivity, pH, D.O., phosphates, and nitrates. He also calculated the outputs of rivers affecting the Sound and determined currents within the Sound. Higgins and Eleuterius (1978) calculated the surface area, volume, and other bathymetric statistics for Mississippi Sound. Eleuterius (1979a) and Eleuterius and Beaugez (1979) compiled a hydrographic and climatic atlas for Mississippi Sound. Eleuterius (1983) examined the surface and bottom salinity of the Mississippi Sound as a part of a larger multi-year hydrological study. Contour charts showed a general decline in salinity from east to west although points of freshwater flow and island passes caused alterations of high and low salinities throughout the basin. As part of a larger study of the Sound's seagrass production, Sullivan et al. (1991) and Morcreiff et al. (1992) measured water temperature, salinity, sea state, turbidity, and current speed at their study sites. Blancher and Barrineau (1983) estimated the annual loadings of parameters such as total solids, phosphorus, nitrogen and organic carbon in the Mississippi Sound and Mobile Bay. They found loadings were highest in areas of extensive development and that these loadings were correlated with degraded water quality.

Other estuarine systems

These hydrological studies concern other bay and estuarine systems. Terrebonne (1973) discussed the economic losses resulting from water pollution in Pensacola Bay. The report shows major sources of pollution in the watershed. Moshiri et al. (1980a) conducted water quality studies in Santa Rosa Sound. Stewart (1992b) collected water quality parameter readings between July 1991 and May 1992 from Brown's Pond sampling station in Gulf Breeze, adjacent to GUIS-FL that included measurements of conductivity, temperature, D.O., and pH.

Ponds and lagoons

The inland saline, brackish, and fresh waters of GUIS have been the focus of considerable research. Heitmuller (1968) studied the water quality of Fort Pickens Pond on Santa Rosa Island. He measured conductivity, salinity, alkalinity, temperature, pH, nitrate, D.O., chlorophyll, and carbon assimilation. Shabica and Watkins (1982) surveyed the ponds and lagoons of Horn and Petit Bois Islands. Pond size and location were documented and recommendations for future research were presented. In a 1987 study of fish assemblages in the tidal pools of Horn Island, Doherty estimated the volume and area of tide pools and collected a wide variety of physical and hydrological data (Doherty 1987). Cofer-Shabica (1989) conducted a comprehensive study of the ponds and lagoons of Horn and Petit Bois Islands. The report includes geophysical descriptions of the ponds, discusses their evolution, and makes a detailed description of salinity. The ponds vary from brackish to saline and are affected by washover, connection to Mississippi Sound, rainwater, and percolation. As part of a larger fish study, Beckett et al. (1992) recorded salinity, area, and depth of freshwater ponds on Horn Island.

Hardy (1992) characterized East Pond in the Fort Pickens area. The author collected a wide range of data including physical characteristics and chemical and limnological measurements. Parsons (1993) characterized three ponds in the Fort Pickens area. Research included a variety of physical and chemical measurements taken over three months in 1993. Reports on the fauna of brackish and freshwater ponds of the GUIS-FL islands by Boyd et al. (1994, 1995) include chemical analyses. Snyder et al. (1996) characterized three ponds on Santa Rosa Island. The study focused on salinity of the ponds. Baseline salinity was calculated, the amount of saltwater intrusion resulting from overwash was determined, and the amount of rainfall necessary to change the salinity was quantified. The report includes a physical description of the ponds, a survey of flora and fauna in the ponds, and an assessment of damages caused by Hurricane Opal.

Experts: Ellen McCarron (Watershed Monitoring & Data Management – FDEP); Mike Barntett (Beaches and Wetland Resource Program – FDEP); Harold Bishop (Land & Water – Surface Water – MDEQ); Charlotte Bryant – Byrd (Land & Water – Groundwater – MDEQ)

AIR QUALITY

Although no studies have been conducted on GUIS to determine the air quality within the park there are a number of monitoring stations located along the coast and operated by the states. Summaries of ambient air monitoring are available on the MDEQ for some years and are available on their website (MDEQ 2004). Air monitoring sites exist along the MS coast in Pascagoula and Gulfport. Along the FL coast, the Florida Department of Environmental Protection has multiple monitoring sites. Historic and current information from these sites is available on their website (Florida Department of Environmental Protection 2004).

The park's air quality can be assessed from the National Atmospheric Deposition Program/National Trends Network (NADP/NTN) data collected at the Washington Parish, LA site (#LA30, ~65 miles NE of GUIS-MS) and from the Sumatra, FL site (#FL23 ~135 miles E of GUIS-FL). The Washington Parish, LA site data showed a slight decrease in wet sulfate concentration and deposition, but no trend in wet nitrate concentration and deposition and no trend in wet ammonium concentration and deposition. Trend data for the Sumatra, FL site are not yet available (T. Maniero, personal communication, May 2004).

The nearest Mercury Deposition Network (MDN) sites at Oak Grove, Perry County, MS site (#MS22, ~45 miles N of GUIS-MS), Centreville, AL site (#AL03, ~180 miles N of GUIS-FL), the Mobile County, AL site (#AL24 ~55 miles WNW of GUIS-FL or ~ 40 miles NE of GUIS-MS), and the Baldwin County, AL site (#AL02, ~55 miles WNW of GUIS-FL or ~ 60 miles NE of GUIS-MS). There are no MDN monitors in the Florida panhandle. Alabama currently monitors airborne mercury near Mobile and the state may expand their toxics monitoring program in the future (T. Maniero, personal communication, May 2004).

The nearest Clean Air Status and Trends Network (CASTNet) site is the Sumatra, FL site (#SUM156 ~135 miles E of GUIS-FL) and the nearest Interagency Monitoring of Protected Visual Environments (IMPROVE) sites are at Breton National Wildlife Refuge (NWR), LA

(#BRET ~45 miles SSW of GUIS-MS); St. Marks NWR (~180 miles E of GUIS-FL), and the Sipsey Wilderness Area, AL site (#SIPS, ~ 275/285 miles N of GUIS-FL/MS) operational since 1992. Except for Breton NWR, all are too distant to be meaningful for assessing acid deposition or visibility on GUIS (T. Maniero, personal communication, May 2004).

Florida has been talking to GUIS staff about installing an air quality monitor at Fort Pickens. The equipment would monitor ozone, sulfur dioxide, nitrogen dioxide, mercury, and a number of hydrocarbons, including toluene, benzene, formaldehyde, methane, and ethanol. The state would like to have the equipment operating by Spring 2005 (T. Maniero, personal communication, May 2004).

Mississippi has been monitoring air toxics for two years at four locations: Pascagoula and Gulfport (GUIS) and Tupelo and Jackson (NATR). A site will be added at Grenada this year. All sites monitor the 33 pollutants that are part of the U.S. Environmental Protection Agency's (EPA) Urban Air Toxics Monitoring (UATM) Program. A website that explains the UATM program and summarizes the data should be available in the near future (contact Thomas Dzomba of EPA at 404-562-9025 for more information).
The state monitors fish tissue for the fish consumption advisory program. The Yockanookany River currently has consumption advisories for PCBs and mercury (NATR), and the gulf coast has an advisory for mercury in king mackerel (GUIS). For more information, see http://www.deq.state.ms.us/newweb/homepages.nsf.

Experts: Mary Evelyn Barnes and Jerry Beasley (Air quality, Office of Pollution Control Air Division MS); Mary Jean Yon (District Director, Northwest District Air Resource Management); Tim Simmons (FL 850-595-1224) Tammy Eagen (FL 850-921-9567); B.J. Hailey (Hazardous Air Pollutions MDEQ 601-961-5783)

ECOSYSTEM STUDIES

The ecology of GUIS has been extensively studied. Included in this section are studies examining the interaction of organisms with other organisms and with the environment. Much of the research in this section is also cited in other sections of this summary.

BAY/SOUND

Mississippi Sound

Mississippi Sound is an important habitat area of GUIS-MS and numerous studies have examined its ecology. Humm and Caylor (1957) studied the summer marine flora of Mississippi Sound. Christmas (1973) reported on a comprehensive study of the estuarine system of Mississippi Sound that included data on the environment, hydrology, sedimentology, and biology. Mulkana and McIlwain (1973) studied the abundance and seasonal variation of *Chaetognatha* in MS. Samples were collected monthly from a single station and seasonal abundance was determined. The authors also collected temperature, salinity, and transparency. Eleuterius (1974) reported on the establishment of plants in spoil areas of Mississippi Sound and adjacent waters. Burke (1975) studied the occurrence and seasonal abundance of pelagic Cnidaria in Mississippi Sound and adjacent waters. Samples were collected regularly by plankton and trawl nets, and by dredging. Results show habitat and seasonal abundance of organisms. A variety of hydrological data was also recorded. Perry et al. (1979) reported on the first recorded red tide algal bloom (*Gonyaulax monilata*) in Mississippi Sound which was aerially mapped and tracked. Water samples were used to determine algal concentration. Lytle and Lytle (1983, 1985) studied pollutant transport in Mississippi Sound. They examined sediments (both core and surface) in the Mississippi Sound for contaminates such as organic wastes and hydrocarbons and examined levels of total organic carbon, Kjeldahl nitrogen, phenols and grain size of sediment. Additionally they conducted toxicological examinations of minnows, shrimp and amphipods and found significant mortalities due to bioassay exposures from surface sediments particularly in the eastern Sound. Using all this data they created an 'environmental stress index' for the Sound that depicted areas where caution should be exercised in future developments.

Several ecological studies have focused on plankton communities in the sound. Mulkana (1967, 1968) examined seasonal changes in the standing crop of plankton in Mississippi Sound. Anderson (1968) studied the ecology of foraminifera species from Mississippi Sound and adjacent waters. Mulkana and Abbot (1973) studied the nutritional components of plankton in the Mississippi Sound. Samples were analyzed for protein, carbohydrates, lipids, calories, and ash. Discussion focused on seasonal variations. Perry and Christmas (1973) conducted a survey of the zooplankton of Mississippi Sound. Their report discusses abundance, distribution, and seasonal variations.

Studies on the ecology of crustaceans have also been conducted in Mississippi Sound. Christmas et al. (1966) studied seasonal variations and abundance of penaeid shrimp in Mississippi Sound. Shrimp were sampled with trawl nets on a semi-weekly basis at established stations. A variety

of physical and meteorological data were also collected. McIlwain (1968) studied seasonal variations in pelagic copepods in Mississippi Sound. He collected samples at a designated site once a month for 15 months. Results discuss the seasonal abundance. Phillips (1971) studied the ecology of mudshrimps (*Callianasa sp.*) in Mississippi Sound. Specimens were sampled throughout the Sound. The number, species, and the gonadal conditions of females were recorded. Burrow openings were observed in the field. Stomach contents were recorded and shrimp were observed in aquaria for reactions to various substrates. Some environmental data concerning study sites were recorded. In a study on the population characteristics of *Chrysaora quinquecirrha*, a sea nettle medusa, in the Mississippi Sound, Morris (1983) also examined its symbiotic associations. Over 70 percent of the individuals sampled had some form of brachyuran symbiont, including *Libinia dubia*, *Callinectes sapidus*, *C. similis*, *Portunus gibbesii*, and *Pinnixa* sp. He also found that the relationship between the sea nettle and the crab changed as the crab developed, starting with commensalism, to facultative parasitism, and finally to predation.

Fish studies represent some of the most important research on the Mississippi Sound ecosystem. Christmas and Howse (1970) studied the occurrence of lymphocystis in the Atlantic croaker and sand seatrout of Mississippi Sound. Affected fish collected from monthly seining samples were measured and described. A variety of hydrological data were also collected from sample sites. Cave (1978) studied predator relationships of the American oyster and the black drum in Mississippi Sound. Overstreet and Heard (1978a&b) studied the diets of Atlantic croaker and red drum in Mississippi Sound. Stomach contents were analyzed from fish captured in trammel nets. In 1982 the same authors analyzed the stomach contents of six species of commercially important fish from Mississippi Sound (Overstreet and Heard 1982). Fish were collected by trammel net. Results list food items and percent occurrence of fish species. Steen and Laroche (1983) studied the dietary habits of larval and juvenile red drum in Mississippi Sound and the Northern Gulf of Mexico. The authors collected fish by seine and dissected the gastrointestinal tracts to identify contents. They found that copepods and crustacean nauplii were the dominant food items eaten by the red drum. As a part of the U.S. Army Corps of Engineers Dredged Material Disposal Study Program, Shaw and Johnson (1983) sampled the macrofauna of Mississippi Sound and adjacent areas to determine community structure and species diversity. They found that the area supported one of the most diverse and productive benthic fauna compared to other areas along the Gulf Coast.

Other estuaries

Moshiri (1974) determined a nitrogen-phosphorus budget for Bayou Texar in Pensacola, FL. Cooley (1978) inventoried the animals occurring in the Pensacola Bay estuary. The report discusses the abundance, distribution, habitat, and season. Summers (1996) prepared a report concerning environmental monitoring of Pensacola Bay and Escambia Bay, FL. The report shows sample sites, ecological indicators, pollutants, salinity, benthic communities, marine debris, and sediment contaminants. Thorpe et al. (1997) outlined a plan for the management of the Pensacola Bay watershed system. The plan covers the drainage systems of the Escambia, Blackwater, and Yellow Rivers, including strategies and goals for upland and estuarine areas. Debusk (1998) reported on a one year study of the impact of a septic system leachfield near Fort

Pickens upon the groundwater and surrounding surface water. Bacterial and nutrient contamination was tested and evaluated in nearby Pensacola Bay waters.

Seeking to update knowledge of the sound's ecosystem, Young et al. (1987) characterized the physiochemical properties and macroinvertebrate populations of Santa Rosa Sound. The Florida Department of Environmental Regulation (1997) published a biological assessment of Little Sabine Bay in relation to a dredge and fill report.

McLellend (1987) studied phytoplankton productivity and community dynamics in Ocean Springs Harbor.

VanderKooy et al. (2000) examined the relationship of prey abundance and feeding habits of three sunfish, redspotted sunfish (*Lepomis miniatus*), redear sunfish (*Lepomis microlophus*), and bluegill (*Lepomis macrochirus*) in an estuarine bayou. They found that differences in trophic levels were based more on prey type than feeding habitat.

GULF OF MEXICO

As part of a multi-part investigative study, Rakocinski et al. (n.d.-a) studied the biodiversity of fish species located in the north central Gulf of Mexico. From 98 epibenthic samples taken from 12 sample sites on Ship and Horn Islands, MS and Perdido Key, FL, they identified 57 species of fish. Discussions included species composition and commercial importance. Franks et al. (1972) examined the influence of physical, chemical and geological parameters on nektonic and benthic fauna in the Gulf of Mexico and off the coast of MS.

PONDS AND LAGOONS

The ponds and lagoons of GUIS are unique enclosed ecosystems and have been the focus of extensive research. Much of the research examines the general ecology of these inland waters. Higgs (1958) studied changes in a tide pool on Horn Island. A study by Heitmuller (1968) includes a description of the ecology of Fort Pickens Pond on Santa Rosa Island. Jacobs (1980) conducted a study of the shoreline dynamics and pond ecosystems found on Horn Island. Cofer-Cofer-Shabica (1989) conducted a comprehensive survey of the ponds and lagoons of Horn and Petit Bois Islands, MS. He determined that Horn Island has 63 ponds covering 5.8% of the island's land mass and that Petit Bois has 17 ponds covering 3.2% of the total land mass. The ponds tend to be located toward the eastern and geologically oldest sections of the islands. He discussed the evolution and geophysical changes of ponds. The report also includes a discussion of pond salinity and the factors that influence it. The ponds studied varied from brackish to saline. Hardy (1992) characterized East Pond in the Fort Pickens area of GUIS. The author collected a wide range of data including physical characteristics, chemical and limnological measurements, and floral and faunal species lists. Parsons (1993) characterized three ponds in the Fort Pickens area. Research included a variety of physical and chemical measurements taken over three months in 1993. Snyder et al. (1997) studied the effects of Hurricane Opal in 1995 on

the aquatic habitats of the Fort Pickens area. The study found significant saltwater intrusion, shoreline loss, and vegetation loss at four natural ponds.

A variety of studies examined the fauna of ponds and lagoons. Hase (1982) conducted a study concerning increasing the oyster productivity of lagoons on Horn Island. The study compared three substrates to determine which was most preferred as attachments for oysters. In another experiment, the study examined hatchery reared oyster survival on various substrates in both protected and unprotected conditions. Growth rates were compared for the lagoon, Biloxi Bay, and Mississippi Sound. Sherrard (1983a&b) analyzed macrobenthic assemblages in various habitat types in Ranger Lagoon, Horn Island. Results concern habitats, geomorphology, hydrology, community structure, and biodiversity. Five microhabitats (sand, silt, intertidal, grassbeds, and oyster reefs were delineated. Of these five microhabitats, the silt microhabitat had the lowest species diversity while grassbeds had the highest. Boyd et al. (1994, 1995) reported on the fauna of brackish and freshwater ponds of the islands of GUIS. The report includes observations on fish behavior and on the occurrence of parasites of invertebrates and vertebrates. Chemical analyses are also included. Viskup (1995) compared macroinvertebrate assemblages in fresh and brackish ponds on Horn Island.

Fish studies represent an important portion of the ecological research of the inland waters of GUIS. Franks (1968, 1970) conducted surveys of the fish populations of the inland waters of Horn Island. He used a variety of net collection methods to sample fish at designated sites. The report includes a variety of data such as size, abundance, location, habitat, life history, and stomach contents. The report discusses the general ecology of the waterbodies studied and also includes detailed descriptions of the physical environment and some hydrological data. Doherty (1987) and Ross and Doherty (1994) studied fish assemblages of tide pools on Horn Island. They used seining to sample pools four times during the year. Species were identified and measured and subsamples were used to study biomass and stomach contents. The results include discussions of assemblage structure, life history, environmental interactions, and trophic structure. The area and volume of the pools were estimated and a wide variety of physical and hydrological data were collected. Beckett et al. (1992) surveyed species of bluegills and other sunfish in the ponds of Horn Island, MS. Fish were sampled by seine. Pond area, depth, and salinity were also recorded.

INTERTIDAL SURF ZONES

The surf zones of the islands of GUIS have been the site of many fish and invertebrate community studies. Modde and Ross (1981) studied seasonal variations in fish occurring in the surf zone of Horn Island, MS. The authors sampled six times over a 24-hour period once a month during the study period. The results concern seasonal variations in occurrence, daily activity patterns, species composition, and factors that affect occurrence. They found more fish in the surf zone seasonally from late summer to fall and daily from 0300 to 0900 h CST. In 1983 these authors studied trophic relationships between Florida pompano, gulf kingfish, scaled sardine, striped anchovy, and dusky anchovy on Horn Island (Modde and Ross 1983). Fish were sampled from the surf zone by bag seine once monthly for 24 months. The stomach contents were analyzed and results were presented by species. They also found that summer resident

species could be divided into two groups based on behavior; individuals that use the surf zone as a feeding and perhaps shelter area and those that used it primarily for shelter. McMichael (1981) and McMichael and Ross (1980, 1987) studied the relative abundance and dietary habits of gulf, southern, and northern kingfishes in the surf zone of Horn Island, MS. Fish were collected over 24-hour periods throughout the year and stomach contents were analyzed. The seasonal and diel variations and diet of fish was discussed. Ruple (1984) conducted a survey of larval fish on Horn Island. He discussed habitat, community composition, abundance, seasonal variations, spawning, and diet. Ross et al. (1987) studied the daily behavior of fish and macroinvertebrates in the surf zone of Horn Island, MS. Samples were collected by seine six to eight times daily at designated sampling stations at different times of the year. A variety of environmental data was also collected.

Heard and Stuck (1987, 1989) conducted a comprehensive multipart study examining the macroinvertebrate fauna of the swash and subtidal zones of Ship and Horn Islands, MS and Perdido Key, FL. The study was designed to identify indicator species and provide a baseline for further monitoring and management. Qualitative and quantitative sampling was performed at established stations. Bruce (1989) studied the invertebrates associated with the thinstrip hermit crab on Horn and East Ship Islands. Organisms were sampled from crabs taken from selected beaches. She discussed the type of symbionts, type of gastropod shell, and number of crabs infected. Rakocinski et al. (1990a) studied macroinvertebrate assemblages on the beaches of West Ship and Horn Islands and Perdido Key. Results concern biodiversity and environmental correlations. A series of monitoring reports by Rakocinski et al. (1990b, 1991b, 1992, 1993a, 1994) studied the effects of beach nourishment at Perdido Key upon the macroinvertebrate communities of the beach. The study covered the area of nourishment from the beach to 800 meters seaward from the original beach location. They concluded that recovery rate, species diversity, distribution, and community composition of macroinvertebrate fauna were adversely affected following the project and were continuing to recover at the time of final report. Rakocinski et al. (1993b) described the variation and zonation in macrofauna found along the sandy-shore of Perdido Key.

COASTAL MARSHES

Tagatz et al. (1974) studied the effects of malathion pesticide application on caged blue crabs, grass shrimp, and sheepshead minnows.

SEAGRASS BEDS

The seagrass beds of the waters of the park represent a unique and fragile ecosystem that has received much research effort. Eleuterius (1971, 1973) surveyed the aquatic plants of Mississippi Sound and adjacent waters to determine seagrass and algal habitat distribution. Salinity and turbidity were measured. As part of a project to revegetate areas of Mississippi Sound with turtle grass, manatee grass, and shoal grass, Eleuterius (1975) discussed the ecology of the sound's seagrass beds. Eleuterius and Miller (1976) compared the condition of Mississippi Sound's seagrass beds before and after Hurricane Camille. Eleuterius (1989) studied

the loss of seagrasses from Mississippi Sound and discussed human causes for the loss. In complimentary reports, Sullivan et al. (1991), Daehnick et al. (1992), Moncreiff et al. (1992), and Moncreiff (1993) reported on a study of the primary production of seagrass beds in Mississippi Sound. The biomass of seagrass and associated epiphytes was determined in selected areas and primary production was calculated. Phytoplankton production was estimated. The effects of epiphytes on seagrasses and grazing of seagrass epiphytes are discussed. The relation of light and production is discussed. Wear (1995), Sullivan and Wear (1996), and Wear et al. (1999) studied the effect of fertilization on the seagrasses and their epiphytic algae in Big Lagoon, Perdido Key. The study examined three species of seagrass, shoal grass, turtle grass, and Manatee Grass, and identified their three major classes of epiphytes, diatoms and red (*Acrochaetium flexuosum*) and brown algae (*Myriotrichia subcorymbosa*). The study showed significantly increased growth of epiphytes in the study area and indicated that cultural eutrophication could cause problems for this area. Wear et al. (1999) discussed the possible elimination of 1-2 species and the conversion of Big Lagoon to a monoculture. Switzer (1996) conducted a study on the colonization of artificial seagrass off of Horn Island. He examined how habitat modification would affect crabs and fish. Heck et al. (1996) and Heck and Zande (1997) conducted surveys of the seagrass beds of GUIS and reported on the results of several studies of seagrass health on GUIS. They examined Big Lagoon following Hurricane Opal in 1995 and found seagrass degeneration due to burial. A second study examined seagrass populations in Big Lagoon and Santa Rosa Sound and found that turtle grass and shoal grass populations were presently healthy in the MS areas sampled while FL sites showed decline . Manatee grass populations were in decline generally, having disappeared from the MS sampling sites. Currently there is no turtle grass on GUIS-MS.

DUNES

Many studies have examined the beach and dune habitats of GUIS. Many of these studies have focused on animal populations using dune habitats. Blair (1951) studied population structure, social behavior, and environmental relations of the Santa Rosa beach mouse. A capture-recapture study was performed in a 65-acre study area on Santa Rosa Island. The location of capture, breeding condition, and post-release behavior were noted. The study included discussions of behavior, habitat, food, track records, and holes. Valentine (1969) reported on a survey of nesting bird colonies on Horn, Petit Bois Islands, MS and Chandeleur Island, LA. The report included estimates of species composition and population size for each colony. Humphrey and Barbour (1981) studied the status and habitats of three subspecies of beach mouse in FL. Holliman (1983) studied the demographics and habitats of the Perdido Key beach mouse and Alabama beach mouse on the AL Gulf Coast. Meyers and Bentzien (1983) studied the status and habitats of beach mouse subspecies (*Peromyscus polionotus subsp.*) on the Gulf Coasts of AL and FL. Mice were collected from established trapping stations. Physical site characteristics, weather data, and data concerning potential predators and competitors were collected from the study sites. Holler and Mason (1988) and Holler et al. (1989) reintroduced the Perdido Key beach mouse at sites on GUIS-FL. The study included descriptions of vegetation and observations on mammal tracks in the release sites. Holler and Moyers (1991) and Holler et al. (1992) monitored Perdido Key beach mouse populations during beach nourishment on Perdido Key. Oli et al. (2001) studied the long-term viability of two isolated populations of beach mice

along the Gulf Coast of AL, Perdue unit of Bon Secour National Wildlife Refuge, and GUIS-FL. They predicted virtually all populations of beach mice would be extirpated under the current level of habitat fragmentation. Nicholas and Jacks (1996) prepared a summary of loggerhead and green sea turtle nesting and monitoring activity for the GUIS-FL. The report describes methods used to mark and monitor nests and presents data concerning total nests and nest depredations.

There have been a few studies examining beach and dune vegetation ecology. Coghlan et al. (1955) studied the establishment of beach communities in Davis Bayou, MS. Hugley and Eleuterius (1976) compared dune vegetation between Horn Island and Belle Fountaine Beach, MS. Hall (1978) studied beach phytomass on Horn Island. Weber (1989) and Cibula and Weber (1996) described *Hygrocybe andersonii* (=*Inonotus andersonii*) a new species, on Horn Island on GUIS-MS. *H. andersonii* is unique to barrier islands and coastal dunes and is always associated with the shrub seaside rosemary. They describe morphological and biochemical distinguishing characteristics.

GENERAL BARRIER ISLAND

Numerous research efforts have examined the ecology of general barrier island habitats. Some of these studies have focused on inner island vascular plant species. Miller and Jones (1967) and Wofford (1967) conducted surveys of the vascular plants occurring on Ship Island. Surveys included annotated species lists and physical habitat descriptions. Miller and Miller (1972) and Miller (1973, 1975) examined vegetation dynamics on Ship Island. Vegetation was analyzed across transects to produce an inventory and describe community distribution. The effects of topography upon distribution and succession were examined. The effects of hurricanes upon the island's forests were discussed. Eleuterius (1979b) conducted a comprehensive study of the plant ecology of Horn and Petit Bois Islands which, included an exhaustive collection of vascular plants and discussed vascular and nonvascular plant ecology. The author described the physical environments and plant communities and made special discussions concerning live oak and slash pine as well as the effects of various types of disturbances.

Some of the most common studies of general barrier island ecology have involved the study of migratory songbird ecology on the GUIS-MS islands. Weber (1976, 1983) compared mainland bird populations in De Soto National Forest with populations on the GUIS-MS barrier islands. He used vegetation analysis, censuses, and behavioral observations to compare community structure and foraging ecology. Kuenzi (1989) and Kuenzi et al. (1991) studied stopover biology of Neotropical songbirds on East Ship Island. Mist nets were used to capture and recapture birds. Size, body mass change, and arrival and departure dates were determined. Insects were sampled to determine food availability. Moore and Simons (1989) studied the suitability of habitat of East Ship Island, GUIS-MS and Peveto Woods, LA for the stopover of Neotropical migrant songbirds. Insects were sampled from air and vegetation and study site vegetation was described. Birds were captured and recaptured using mist nets and size, weight, and fat score were taken. Duration of stay and physical changes were recorded. Moore et al. (1990) studied spring migratory songbirds stopping on Horn Island, MS. They used point counts across various habitat types to examine abundance, behavior, and mortality sources. Moore (1993) studied

habitat utilization of Horn and East Ship Islands by migratory songbirds. Fat scores were taken and birds were weighed, measured, and banded. Duration of stopover, body mass change, and energetic condition were determined. Vegetation types were described and flying and nonflying insects were sampled to determine food availability. The author discussed migration, patterns of spring arrival, condition of arrivals, habitat use during stay, stopover duration, physical changes during stopover, fall migration mortality, and suitability of habitat.

Other important ecological studies have examined GUIS-MS barrier island ecology through studies of mammals. Brent and Corcoran (1977) studied the effect of feral hogs on the stability of Horn Island. Baron (1979, 1982) analyzed the effect of feral hogs on the vegetation of Horn Island. Studies determined the most affected vegetation types and suggested damage was not as severe as predicted. Wolfe (1985) conducted a study of mammal – habitat relationships on Horn, Ship, and Petit Bois Islands. He established track lines in five different habitats and monitored track stations. He also conducted an exclusion study to measure the effects of feral hogs upon vegetation. Esher (1987) and Esher et al. (1988) conducted a comprehensive survey of the mammals of GUIS-MS Horn, East and West Ship, and Petit Bois Islands of GUIS. They examined the following for the populations studied: sex and age composition, reproductive status, seasonal abundance, home range, the impact of exotic species, and diet. Species examined for diet included raccoons, nutria, cottontail rabbits, black rats, and rice rats. Raccoon diets consisted largely of crabs, insects and fruit. Rabbit diets varied seasonally and included sea oats, sea rocket, and torpedograss. Nutria diets also varied seasonally and included sea oats, torpedograss, cattails, and cordgrass. Mammalian impact caused slower recovery and weaker plants but was not found to eliminate any plant species. Recommendations for management and future research are presented. Another compilation by Esher (n.d.) contained data tables concerning small mammal studies including baiting and mark-recapture studies and red wolf trapping and tracking. Herring (1988) discussed the dietary habits of nutria, eastern cottontail, and raccoons on Horn Island. Nutria and cottontail feeding habits were observed *in situ* and all species were dissected to determine stomach contents. Esher et al. (1990), Simons (1990), and Esher and Simons (1993) reported on the progress of red wolf propagation activities on Horn Island, MS. Wolves were monitored by radio telemetry and scat analyses and small mammal population studies were conducted using by trapping, tracking stations, and transect observations. Gathen (1994) analyzed the ecological impact of historical and prehistorical hurricanes on Horn Island. Weller (1995) studied the diets of red wolves on GUIS-MS Horn Island. Radio telemetry was used to monitor wolf behavior. The contents of 650 scats were analyzed using various statistical methods.

UPLAND WOODY

A few studies have examined the woody and forest systems of the GUIS barrier islands. Pessin and Burleigh (1941) studied the forest ecology of Horn Island. Miller and Miller (1972), Miller (1975), and Miller and Stoneburner (1976) examined vegetation dynamics on Ship Island, MS. The effects of topography upon distribution and succession were examined. The effects of hurricanes upon the island's forests are discussed. Stoneburner (1978) studied the effect of hurricanes on slash pine forests GUIS-MS barrier islands. Tree ring patterns were compared with hurricane records. Coincidence of wide ring patterns was found between islands. Carter

and Young (1993) studied the stress endured by slash pine and wax myrtle on Horn Island. To measure stress they measured leaf conductance, spectral reflectance, and concentration of chlorophyll a and b.

MAINLAND FORESTS

Live oaks are an important woody species on the mainland of GUIS. A GUIS vegetation management plan for the Naval Live Oaks Reservation, the first forest experiment station in the U.S., discussed the history, condition, and management of the live oaks (GUIS n.d.). It describes historical vegetation from 1828 until the date of the report. The ecosystem of the forest is detailed, including soils, animals, and weather impacts. Fire prevention and management systems are described. Edmisten (1974) used core sampling and diameter measurements to determine the age of live oak trees in the Live Oaks Reservation of GUIS. He reported that the oldest tree studied was between 61 and 70 years old and surmised that the present location of the Reservation was previously covered with pines.

MANAGEMENT ISSUES

The reports and studies in this section deal with management concerns at GUIS. Many of the management issues concern the protection of natural resources and mitigating the effects of various types of disturbance such as human use, beach nourishment, and storm impacts.

ADJACENT LANDUSES AND PARK DEVELOPMENT IMPACTS

In 1976, five years after the creation of GUIS, the NPS conducted a number of environmental impact assessments for the National Seashore (NPS 1976b, c, d; Robinson and Dittberner 1976). Various authors were involved and the reports were published by the Denver Service Center of the NPS. Robinson and Dittberner (1976) reported on the environmental impact of the GUIS general management plan. The report discussed alternatives for visitor use, development, and resource management. Other NPS reports (1976abc&d) separately examined the environmental impact of possible development and management strategies for Davis Bayou, Fort Pickens, Naval Live Oaks Reservation, and Santa Rosa Island, GUIS-FL. Reports included descriptions of the natural environment covering physiography, soils, water, vegetation, and wildlife. The NPS (1978) issued a final environmental statement concerning GUIS generally and treated the specific areas mentioned above.

Other, more recent documents and research have dealt with development and landuse in and around GUIS. In a NPS report, Hodapp (1980) discussed the expected impact on natural resources of various development plans at the Fort Pickens area. In the U.S. Army Corps of Engineers Dredged Material Disposal Study Program, Barrineau and James (1983) examined the effect of dredging and disposal practices on the natural resources and economy of the Mississippi Sound and adjacent areas. Using modeling they found that dredge material placed as a subtidal fan near the east end of Horn Island would likely be transported into the sound by currents and may jeopardize the grassbeds on the sound side of Horn Island. In 1988 the U.S. Army Corps of Engineers prepared a plan for dredging Gulfport Harbor, MS (Bonine 1988). Various appendices to the main document ("General Design Memorandum") dealt with environmental and ecological impacts. In the dredging plan's Appendix the natural resources and the expected impact upon them was described. The same issues were addressed in a 1989 final environmental impact statement by Rees (Rees 1989a, b). Okerson (1988) described the changes in historical landuse of Santa Rosa Island from prehistoric time to the 1980's. A Fire Management Plan prepared by GUIS addressed the need to mitigate the impact of development of lands adjacent to both GUIS-FL and GUIS-MS (Seashore 1998).

Contamination

Contamination from spills, pesticides, and general pollution has received some research effort at GUIS. Terrebonne (1973) discussed the economic losses resulting from water pollution in Pensacola Bay and showed major sources of pollution in the watershed. Rinkel and Jones (1973), under the auspices of the Florida Coastal Coordinating Council, studied the coastal zone of Escambia and Santa Rosa Counties, FL as part of an effort to promote research into problems affecting coastal areas. The study contained five major areas of investigation and included a

coastal zone management plan. Lytle and Lytle (1983, 1985) studied pollutant transport in Mississippi Sound. They examined sediments (both core and surface) in the Mississippi Sound for contaminates such as organic wastes and hydrocarbons and examined levels of total organic carbon, Kjeldahl nitrogen, phenols and grain size of sediment. Additionally they conducted toxicological examinations of minnows, shrimp and amphipods and found significant mortalities due to bioassay exposures from surface sediments particularly in the eastern Sound. Using all this data they created an 'environmental stress index' for the Sound that depicted areas where caution should be exercised in future developments. Summers (1996) prepared a report illustrating areas and factors important to the environmental monitoring of Pensacola and Escambia Bays, FL. The report shows sample sites, ecological indicators, pollutants, salinity, benthic communities, marine debris, and sediment contaminants. In 1997 the Bay Area Resource Council published a summary of presentations made at the Pensacola Bay System Technical Symposium (Bay Area Resource Council 1997). The presentations focused on the present and historical status of the bay, environmental impacts on water quality, and management and restoration of the environment. Rakocinski et al. (1997) examined the effect of natural and contaminant-related gradients on macrobenthic communities. When controlling for natural gradients such as salinity, depth, and sediment composition they found that trophic diversity decreased with sediment contamination. Debusk (1998) reported on a one year study of the impact of a septic system leachfield near Fort Pickens upon the groundwater and surrounding surface water. Bacterial and nutrient contamination was tested and evaluated in nearby Pensacola Bay waters. During a similar study in the Gulf of Mexico, Brown et al. (2000) again found the macrobenthic trophic diversity decreased and suggested that the benthic trophic structure could be used to assess toxicological responses at the community level.

Tagatz et al. (1974) studied the effects of malathion pesticide application on caged blue crabs, grass shrimp, and sheepshead minnows. Lores et al. (1985) examined marine biota and seawater for organophosphorus compounds residues from the use of fenthion to control salt-marsh mosquitoes on Santa Rosa Island.

Heard and McLelland (1990) and McLelland and Heard (1991) studied the effect of a September 1989 oil spill at the mouth of the Pascagoula River on the invertebrate populations of Horn Island. The study concluded that crustacean populations declined while polychaete and oligochaete densities increased. The study included sampling sediments for hydrocarbon residues. Zimmerman (1990b) analyzed the sand of Horn Island beaches for hydrocarbons to study the effects of an oil spill.

Ecology And Environment, Inc. (1996) prepared an assessment of the impact caused by a coal barge grounding near Horn Island. The incident and subsequent salvage efforts were described. The natural resources of the area were described. The report included a general discussion of coal in estuarine environments. The impact of the spill was assessed upon seagrass beds and other benthic communities. Recommendations for management were made.

Marine debris

Lott (1992) quantified and characterized litter collected from a 17.8-kilometer section of beach on Santa Rosa Island. The report includes recommendations for litter management. GUIS was

one of eight national parks used by NPS and NMFS in a five-year study on the abundance, composition, and accumulation of marine debris on beaches. Cole et al. (1990), Bishop (1989, 1990, 1991, 1992, 1993), Manski et al. (1990) prepared annual reports for years 1988-1993 detailing yearly findings.

EXOTIC SPECIES

Brent and Corcoran (1977) studied the effect of feral hogs on the stability of Horn Island. A study by Singer (1981) discussed feral hogs in U.S. National Parks that included an assessment of impacts for some of the various parks discussed. According to the author, feral hogs cause minimal damage on GUIS. Baron (1979, 1982) analyzed the effect of feral hogs on the vegetation of Horn Island. Vegetation was sampled, and stomach contents and scats were analyzed. Studies determined the most affected vegetation types and suggest that damage is not as severe as predicted. As part of a mammal–habitat relationship study, Wolfe (1985) conducted an exclusion study to measure the effect of feral hogs upon the vegetation of the GUIS-MS islands. A number of exotic mammal species have been documented on GUIS including nine-banded armadillos (*Dasypus novemcinctus*), Norway rats, black rats, hispid cotton rats (*Sigmodon hispidus*), coyotes (*Canis latrans*), nutria (*Myocastor coypus*), and red foxes (GUIS 2004).

As part of a comprehensive mammal survey of the GUIS-MS islands, Esher (1987), and Esher et al. (1988) discussed the impact of exotic and some native species on native flora and fauna. Species examined included raccoons, nutria, cottontail rabbits, black rats, and rice rats. Raccoon diets consisted largely of crabs, insects and fruit. Rabbit diets varied seasonally and included sea oats, sea rocket, and torpedograss. Nutria diets also varied seasonally and included sea oats, torpedograss, cattails, and cordgrass. Mammalian impact caused slower recovery and weaker plants but was not found to eliminate any plant species.

A number of non-indigenous plant species have also been found on GUIS including, Chinese tallow tree, or popcorn tree (*Sapium sebiferum)* Japanese privet (*Ligustrum japoncium*), Japanese honeysuckle (*Lonicera japonica*), cogon grass (*Imperata cylindrica*), and Japanese climbing fern (*Lygodium japonicum*) (GUIS 2004). These species are actively managed mostly through mechanical removal although chemical methods are employed when others are insufficient..

DISTURBANCE

Off-road vehicles and other human use

Human use is an important consideration when considering its impacts on GUIS. Those impacts and the management of off-road vehicle use have been examined on GUIS-FL. A Natural Resource Management Plan for GUIS prepared by Pridemore (1976) includes a discussion of the management of ORVs in the park. Shabica (1979), Shabica and Shabica (1978) and Shabica et al. (1979) prepared a summary of ORV use and its environmental impacts on Perdido Key, FL. They discussed specifically the damage caused to dunes and dune flora by ORV trails and the

recovery of ORV-disturbed ecosystems. Reports included management recommendations and recommendations for future research. GUIS (1980) prepared a report discussing the management of ORVs on GUIS-FL. The report included government documents related to vehicles on federal land and made specific management recommendations. Shabica and Cousens (1983) prepared a summary of research concerning the impact to vegetation of hurricanes, ORVs, and other human use on Perdido Key. A report by Cousens (1987, 1988) discussed the impact of ORVs on the vegetation of Perdido Key and made management recommendations. Psuty (1988) reported on balancing recreation with environmental concerns on GUIS-FL's Perdido Key.

Revegetation programs have been conducted to mitigate the effects of human use at GUIS. Shabica and Call (1978) conducted a revegetation project on the dunes of Santa Rosa Island following pedestrian disturbance. Dowling (1982) prepared a plan for the restoration of smooth cord grass in the Davis Bayou area of GUIS-MS. The plan detailed all aspects of the project and included lists of area flora. Eleuterius (1989) studied the loss of seagrasses from Mississippi Sound and discussed human causes for the loss. Harvey (1990) prepared a plan for the restoration of dune vegetation on Santa Rosa Island.

Fire

In an assessment of a proposed fire management plan, Sheaffer (1998) concluded that artificially excluding fire from GUIS's natural communities resulted in (among other things) the proliferation of undergrowth that crowded out indigenous plants and animals.

Hurricanes

Hurricane impacts represent one of the most important management concerns at GUIS. Hurricanes affect the biological communities and park structures and facilities, and cause morphological shoreline changes.

Much of the hurricane research on GUIS has focused on the changes that occurred to the park's morphology. Coling (1980, 1981, 1986) proposed and conducted a geomorphic study of shoreline changes on Perdido Key before and after Hurricane Frederic and other storms. Reports included management recommendations. Penland et al. (1980) studied the effects of Hurricane Frederick on Dauphin Island, AL. The study discussed the origins and characteristics of barrier islands and included physical descriptions of responses to hurricane forces. Nummedal (1983) discussed the geology and the storm response of the barrier islands on the northern coast of the Gulf of Mexico including the Mississippi Sound. He found that the extent of hurricane impact varied according to topography (low-profile large amounts of damage; high-profile less damage) that in turn varied according to their stratigraphic evolution. Stone and Salmon (1988) discussed the morphodynamics relating to hurricanes on Perdido Key. Dean and Lin (1995) reported on the effects of Hurricane Erin upon the Perdido Key beach nourishment project. As part of a larger study, Snyder et al. (1996) assessed the damage to three Santa Rosa Island ponds by Hurricane Opal. Stone (1996) and Stone et al. (1996) studied the morphological changes to the shoreline of Santa Rosa Island caused by Hurricanes Erin and Opal in 1995. Previously established transects were used to measure the morphology of beaches and dunes and compare it

to pre-hurricane morphology. Stone et al. (1998a) reported on the impact of Hurricane Opal (October 1995), Tropical Storm Josephine (1996), and Tropical Storm Danny (1997) on the shoreline of Santa Rosa Island. They concluded that, although the storms removed foredunes of less than five meters in height, the total volume loss from this removal was less than anticipated. They also concluded that the overwash caused by the storms actually widened the island and that there was an overall conservation of mass. Schmid (2001) examined the morphology and evolution of West Ship Island and documented its response to Hurricane Georges (1998). He used LIDAR, Global Positioning Systems surveys, cross-shore profiles, aerial photography, sediment cores, and bathymetry to examine the changes in the island.

A number of studies have been conducted on the effect of hurricanes on the vegetation of GUIS. Miller and Miller (1972), Miller (1975), and Miller and Stoneburner (1976) reported on the effects of hurricanes on insular tree species on Ship Island, MS. Miller (1974) studied the impact of two hurricanes upon the vegetation of Ship Island. Stoneburner (1978) studied the effect of hurricanes on slash pine forests on barrier islands in GUIS. Cousens et al. (1983) conducted a study in which they compared the plant communities from a hurricane-disturbed area of Perdido Key with plants in a relatively unaffected area. The unaffected area maintained much of its vegetative cover while vegetation was virtually eliminated in the disturbed area. The disturbed beach began to recover but was again disturbed two years later when ORVs were allowed access to the beach and most seedlings were eliminated. Shabica and Cousens (1983) prepared a summary of research concerning the impact to vegetation of hurricanes and other disturbances. A report by Cousens (1987, 1988) discussed the revegetation of Perdido Key following Hurricane Frederick. Heck et al. (1996) and Heck and Zande (1997) conducted surveys of the seagrass beds of GUIS and reported on the results of several studies of seagrass health. They described a previous study of seagrasses in Big Lagoon following Hurricane Opal in 1995 that reported seagrass degeneration due to burial. In a 1999 final report Breithoff and Snyder studied the revegetation succession of Fort Pickens, Santa Rosa Island following hurricanes Erin and Opal (Breithoff and Snyder 1999). They found significant saltwater intrusion, shoreline loss, and vegetation loss at four natural ponds. Miller et al. (2001) conducted a study on effect of sand fence and vegetation on dune building on Santa Rosa Island after Hurricane Opal. Yahr (2001) examined the restoration of the Florida perforated cladonia, an endangered lichen, on Eglin Air Force Base on Santa Rosa Island after Hurricane Opal.

A couple of studies have also examined the impact of hurricanes on the park's faunal populations. In a three-year study examining the impact of hurricanes Erin and Opal on the populations and habitat of the herpetofauna, Seigel et al. (1997) found that the damage to habitat and populations was relatively minor. Walker (2003) examined the macroinvertebrate community of Perdido Key after Hurricane George. She found that two mollusk species, *M. c. johnstonei* and the marble snail were extirpated from the area and four species not present on the key prior to the hurricane were found in its wake.

BEACH AND DUNE LOSS

Erosion

Beach erosion is one of the most prevalent management issues at GUIS. Many efforts have been made to study and manage this erosion. The University of Florida's Coastal and Oceanographic Engineering Laboratory reported on a study of the coastal processes of the Navarre Pass, Florida area (Coastal and Oceanographic Engineering Laboratory 1973). The study made recommendations for stabilizing the area. A Natural Resource Management Plan for GUIS prepared by Pridemore (1976) contains a special discussion of beach erosion and its management. Henry (1976) coordinated the study and compiled data concerning the effect of hurricane Camille and the effects of subsequent nourishment on shorelines of West Ship Island. In the final report he compared aerial photographs and used bathymetric measurements to discuss the rate of erosion for the nourished beach (Henry 1977). He described the physical environment and discussed the history of shoreline changes. McAlpin (1982) prepared a proposal for managing beaches and dunes within GUIS. The proposal described present conditions, outlined existing and potential problems, determined alternative management plans, and made recommendations. Cubit Engineering Limited (1983) detailed a plan for managing the shoreline of GUIS. The plan described data collection techniques to use in predicting future shoreline topography. Shabica et al. (1993) conducted an NPS study of inlet maintenance at a number of southeastern coastal national parks, including GUIS. The purpose of the study was to provide a historical review of inlet management and to provide recommendations for further management. Recommendations cover inlet monitoring and management strategies, the creation of a database, environmental impact of various strategies, sand management, channel relocation, and alternative uses. Chaney (1999) examined the severe shoreline erosion occurring on the northern estuarine shores of West Ship Island during storm events. He examined the wind, weather and oceanographic data, and found the tides affected the predominant direction of sediment transport.

Beach nourishment

The beaches of GUIS have been regularly nourished with sand to combat erosion. The U.S. Army Corps of Engineers (1979b) reported on the progress of beach erosion control efforts on Santa Rosa Island. Troxel (1986) reported on the dredging activities in Pensacola, FL including the disposal of spoils on Perdido Key and Santa Rosa Island. The report physically described the project and its effects on fish and wildlife and other natural resources. Thackery (1986) used GUIS as a model to report on the effective use of dredged material to nourish eroding beaches in the northern Gulf of Mexico. The paper focused on the cooperation of the NPS, U.S. Army Corps of Engineers, and U.S. Navy in dredging operations.

Between November 1989 and October 1991 approximately 4.1 to 4.3 million cubic meters of dredged material from the Pensacola Passage were placed on the eastern 7.5 kilometers of Perdido Key, FL. This nourishment project was directed at erosion control and widened the beach by approximately 150 meters. The project was extensively monitored from prior to the start of nourishment continuing until at least 1997. Various progress reports and post-nourishment monitoring reports discussed the morphology of the beach and the effectiveness of

the project. A collection of files compiled by Zimmerman (1990a) contained various pre-nourishment discussions. Dean (1988) provided recommendations for dredge spoils along Perdido Key. He also provided information on previous nourishment projects. Work et al. (1990b) conducted pre-nourishment surveys prior to the start of the project. Their report contained comprehensive analyses of beach morphology, bathymetry, sediment characteristics, wave and tide action, and meteorological data. Work et al. (1990a, 1991) and Work and Dean (1992) continued to monitor and report upon the project during and in the years immediately following completion of nourishment. These reports discussed the progress and effectiveness of the work and examined the response of the nourished area to various physical forces. Work (1992) and Work and Dean (1995) analyzed the sediment-transport rates and gradients from the beach nourishment project. They found that cross-shore sediment transport was an important process. Otay (1994) examined how the berms offshore of Perdido Key changed over time. Dean and Lin (1995) reported on the effects of Hurricane Erin upon the project. Otay and Dean (1993), Dean et al. (1995), and Browder and Dean (1997) reported on its continued effectiveness. The 1997 report estimated that approximately 56 percent of the original nourishment material remained at the construction site, with the most severe erosion occurring at the easternmost section of the beach. The majority of the material missing was estimated to have eroded during the last 3.3 years. Work and Kaihatu (1997) examined the effect of the dredged inlet on wave transformation at Pensacola Pass and discussed the importance of these transformations. Browder and Dean (2000) summarized the monitoring data of the shoreline and underwater berm from 1989 to 1998. They again found a retention of 56 percent of the original volume of sand from the project and found the offshore berm had moved inland slightly and volume had decreased slightly.

GUIS-MS has also received substantial beach nourishment. In 1979, the U.S. Army Corps of Engineers (1979a) introduced proposals for continued erosion control at Fort Massachusetts on West Ship Island. The proposal included a description of the site and surrounding environments. Chaney (1993) and Chaney and Stone (1995, 1996) reported on the progress of erosion control beach nourishment on West Ship Island. Material dredged from Ship Island Pass was placed on the beach in front of Fort Massachusetts. The report described the island and the littoral drift processes affecting it. Progress was monitored by establishing transects from which regular bathymetric measurements were taken. Oivanki (1995) reported on a project examining possible sand resources available for beach nourishment near Fort Massachusetts, West Ship Island. Investigation indicated that since 1850 more than 640 acres had been lost to erosion. The most rapid loss had occurred around the south shore of the island. Rock and concrete around the Ship Island Lighthouse restricted the east-west movement of sand along the north shore, adversely affecting erosion problems. It was concluded that these materials should be removed. Suitable sand for nourishment was found north of the island, but was covered by a 1 to 4.5 foot deep mud layer. Stone (1998) reported on the monitoring of a beach nourishment project on West Ship Island on GUIS-MS. The report included data on effectiveness and contained recommendations for further projects.

Multiple studies have also examined the effect of nourishment projects on the park's fauna and flora. Rakocinski et al. (1990b, 1991b, 1992, 1993a, 1994) studied its effects upon macroinvertebrate communities in the years following the study. They found that macrofauna was adversely affected. Rakocinski et al (1996) examined the short- and long-term effects of the

nourishment project on macrobenthic assemblages. They found a decrease in species richness and density as well as a greater instability of these indices and shifts in the assemblage structure. Holler and Moyer (1991) and Holler et al. (1992) studied populations of the endangered Perdido Key beach mouse during a beach nourishment project. The study involved trapping and vegetation studies on Perdido Key, GUIS-FL. Gibson and Looney (1990, 1992, 1993, 1994), Gibson and Ely (Gibson and Ely 1994) and Gibson et al. (1997) examined the impact upon vegetation. Overall, they determined that revegetation was slow but successful. This slow rate of succession was thought to be caused by natural disturbances such as hurricanes. Gibson and Looney (1994) described the colonization of the dredge spoil in the first year after the nourishment. They recommended the additional dredge spoil not be added for a number of years. Looney and Gibson (1995) examined and compared the soil seed bank of seven habitat types, deposited dredge spoil, and unvegetated sites. They found that those sites with little disturbance had highly developed seed banks compared to those that were frequently disturbed

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Appendix A. Federal and State Listed Species that have been documented in or are possible inhabitants of GUIS. List of species was adapted from the GUIS website and past park research.

Species	Scientific name	Status [1]
Plants		
Flordia perforated cladonia	*Cladonia perforate*	Federally Endangered; FL - CI
Mammals		
Perdido beach mouse	*Peromyscus polionotus trissyllepsis*	Federally Endangered; FL Endangered
red wolf	*Canis rufus*	Federally Endangered
Reptiles		
loggerhead turtle	*Caretta Caretta*	Federally Threatened; FL Threatened; MS - CI
leatherback turtle	*Dermochelys coriacea*	Federally Endangered; FL Endangered
Kemp's Ridley sea turtle	*Lepidochelys kempt*	Federally Endangered; FL Endangered; MS - CI
green sea turtle	*Chelonia mydas*	Federally Endangered; FL Endangered
gopher tortoise	*Gopherus polyphemus*	FL - SSC; MS Imperiled
American alligator	*Alligator mississippiensis*	Federally Threatened (S/A); FL - SSC
alligator snapping turtle	*Macroclemys temminckii*	FL - SSC
indigo snake	*Drymarchon corais coupeir*	Federally Threatened; FL Threatened; MS - CI
Amphibians		
No documented or suspected species		
Birds		
Piping Plover	*Charadrius melodus*	Federally Threatened; FL Threatened
Bald Eagle	*Haliaeetus leucocephalus*	Federally Threatened; FL Threatened; MS - CI
Peregrine Falcons	*Falco peregrinus*	FL Endangered
Red-cockaded Woodpeckers	*Picoides boreali*	Federally Endangered; FL - SSC; MS - CI
Snowy Plover	*Charadrius alexandrinus*	FL Threatened, MS - CI
Least Tern	*Sterna antillarum*	FL Threatened
Southeastern American Kestrel	*Falco sparverius paulus*	FL Threatened
American Oystercatcher	*Haematopus palliatus*	FL - SSC
Brown Pelican	*Pelecanus occidentalis*	FL - SSC; MS - CI
Black Skimmer	*Rynchops niger*	FL - SSC
Redish Egret	*Egretta rufescens*	FL - SSC
Snowy Egret	*Egretta thula*	FL - SSC
Little Blue Heron	*Egretta caerulea*	FL - SSC
Tricolored Heron	*Egretta tricolor*	FL - SSC
White Ibis	*Eudocimus albus*	FL - SSC
Burrowing Owl	*Athene cunicularia*	FL - SSC
Fish		
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Federally Threatened; FL - SSC
Invertebrates		
No documented or suspected species		

[1] S/A - similarity of appearance to a threatened taxon; SSC - Species of Special Concern; CI - Critically Imperiled

Appendix B. Management issues and concerns that face GUIS and how these issues may affect the park's resources

Management Issues	Priority	Significant Natural Resources Impacted	Monitoring Questions
Adjacent Landuse	HIGH	Wildlife, surface water, wetlands, viewshed, native habitats, barrier island function.	What effects is adjacent landuse having on park resources? Are wildlife corridors being affected? Is habitat being fragmented? Are barrier island functions being affected by coastal projects updrift of park?
Air Quality (Compliance with Clean Air Act)	HIGH	All encompassing	Are airborne pollutants affecting natural resources? What are the mechanisms of injury?
Climate Change	HIGH	All encompassing.	What habitats and resources are at risk? What are predicted timetables and extent of sea level rise? What effect will temperature increase have on vegetative communities and wildlife?
Data Gaps	HIGH	All encompassing.	What are keystone and indicator species for the park? What is the condition of the park's natural communities?
Erosion	HIGH	Island habitats, soils, T&E species, island structure and function.	What man-influenced factors are exacerbating shoreline erosion inside the park? What are rates of shoreline loss? Are channel maintenance activities starving park islands of sand? What effect is erosion having on park wildlife, especially T&E?
Exotics (Animals)	HIGH	Native plant communities, biological integrity, biological diversity, native animal populations, T&E species.	What is the status and distribution of exotic animals? What impacts are exotic animals having on park resources?
Exotics (Plants)	HIGH	Native plant communities, biological integrity, biological diversity, T&E species, wetlands.	What are the status, distribution, and rate of spread of exotic plants? At eradication sites, are native species recolonizing? Are natural compositions and densities being restored? What long-term effects are the exotics and the treatments having?
Fire Management	HIGH	Most terrestrial and wetland habitats, T&E species, biological diversity.	What is optimum fire frequency for park habitats? Which habitats are fire dependent? How important is fire to island habitats? Is prescribed fire having desired results?
Fishing (Rec & Comm):	HIGH	No commercial fishing is permitted in the park but certain nets can be used plus commercial fishing occurs adjacent to park waters. All marine species (including T&E species and several marine mammals) capable of biting a hook, being snagged or tangled in discarded fishing line, or being netted; by-catch species; and submerged vegetation.	What effect is recreational fishing (and associated activities) having on park marine resources? Are commercial operations outside park boundaries having adverse impacts on park resources? Are artificial fishing reefs installed in nearby waters affecting park fish species?

Appendix B. Continued.

Management Issues	Priority	Significant Natural Resources Impacted	Monitoring Questions
Floodplain protection	HIGH	Coastal habitats, T&E species, estuarine system.	No information
Migratory Birds	HIGH	Migratory birds, habitat.	What is status of habitat usage and habitat condition? What effects is park management or park use having on migratory birds? What are status/trends of populations using park?
Native Species Overpopulation	HIGH	T&E species, native animal populations, native plant communities.	What effects are visitors having on native species (feeding, etc.)? Does human influence drive overpopulation?
Native Vegetation Restoration	HIGH	Native plant communities, wetlands, hydrology, barrier island function.	Are proper plant compositions being attained?
Night Sky	HIGH	T&E species (sea turtles).	What effects is stray light having on park wildlife resources?
Oil/Gas	HIGH	All encompassing	What are the long-term impacts to water quality, sediment quality, aquatic species? Air impacts? Determine zone of influence.
Outside Development	HIGH	Same as Adjacent Landuse.	Same as Adjacent Landuse.
Right-of-ways/Easements	HIGH	Native communities (plants and animals) structure and composition, wildlife, water quality/quantity, viewshed.	Are habitats being adversely fragmented? Are community structures and compositions changing? Does ROW maintenance obstruct or enhance runoff? What effects are maintenance activities having (clearing, pesticides)? What effect is the increased edge habitat having on the native habitats?
Soundscape	HIGH	Nesting and loafing birds, other wildlife, marine mammals.	What are the effects of noise (aircraft, boats, etc.) on park wildlife, especially during nesting activities? Are underwater noises adversely affecting marine mammals? Are there safe distance standards?
T&E Species	HIGH	Native plant and animal communities.	What is the status of T&E species in the park? What effects do park activities have on T&E species? What is the status of T&E habitat?
Visitor Overuse	HIGH	All encompassing.	What long-term impacts are visitors having on park resources?
Water Quality (Ground)	HIGH	Wetlands, vegetative communities, surface water.	Is park groundwater being impacted? Are vegetative communities being affected, changed? Are toxic plumes from area superfund sites and/or industry a threat to park resources?
Water Quality (Surface) (Compliance with Clean Water Act)	HIGH	All encompassing	Is park water quality being degraded? What are the impacts on park resources? What effect is freshwater runoff having? Identify sources (internal and external)?
Water Quantity (Groundwater)	HIGH	Wetlands, vegetative communities, surface water	Are vegetative communities being affected, changed? Is the park experiencing saltwater intrusion? Are aquifers being adequately recharged?

Appendix B. Continued.

Management Issues	Priority	Significant Natural Resources Impacted	Monitoring Questions
Wetlands	HIGH	Hydrology, water quality/quantity, habitat, T&E species, biological diversity.	Are park wetlands being affected by internal or external activities?
With/In Park Development	HIGH	All encompassing.	What are the impacts?
Genetic Contamination	MED	Native vegetation and communities, T&E species.	Are there genetic differences between plants (i.e. sea oats) found on adjacent islands or different latitudes? What effect on park plants is the use of native plants from different geographical areas in landscaping adjacent to the park having? Is hybridization taking place? What effect is genetic isolation having on a subspecies of beach mouse?
Hunting & Trapping	MED	Waterfowl hunting is permitted in certain water areas of the park. Very limited hunting adjacent to park. Prey species (waterfowl and mourning doves) and other wintering species (piping plovers).	Are hunting activities impacting wintering species specifically the endangered piping plover? Are other park species being adversely affected by hunting?
Native Pests	MED	Native species/communities.	Are native pest infestations caused/influenced by man?
Native Wildlife Reintroductions	MED	Wildlife, T&E species, biological diversity.	Why were species extirpated? Is habitat restored adequately?
Non-NPS/ Inholding Issues	MED	Wilderness, water quality, T&E species, viewshed.	What threat do retained mineral rights pose to park resources? Are inholdings located with wilderness pose a threat to the wilderness?
Water Quantity (Surface Water)	MED	Wetlands and wetland communities, groundwater recharge.	Has park and local development changed the surface water regime (overland flow, retention, etc.)? What effect is the increased volume of freshwater runoff having on estuarine and marine systems? Are aquifers being adequately recharged?
Forest pests/Diseases	LOW	Forests.	Need early indicator of forest pests. Are impacts caused by native or non-native pests? Are impacts from native pests being enhanced by human activities?
Mining	LOW	NA	NA
Poaching	LOW	Certain park plants, sea turtle eggs, and certain commercial fish species.	Is poaching pressure increasing? Are fish stocks being adversely affected?
Slope Failure	LOW	NA	NA

Appendix B. Continued.

Management Issues	Priority	Significant Natural Resources Impacted	Monitoring Questions
Subsidence	LOW	NA	NA
Viewscape	LOW	Viewscape is important to the park but not from a natural resource perspective. A degraded viewscape is usually the result of development; that's the root of the problem, viewscape is the symptom	No information

GIS DATA, DATASETS

A list of available spatial and non-spatial data is provided for the park. Data have been organized into the following groups: GIS data, non-GIS digital maps, hardcopy maps, digital databases, digital publications, NatureBib maps, and abbreviations. GIS data have been further separated into three categories: park specific or local, statewide, and nation-wide. A unique identifier has been given to each line of data as follows: "X_#", where "X" is a letter describing the data type (L=local GIS, S=Statewide GIS, N=Nationwide GIS, D=database) and "#" is a unique number. Basic information is provided to allow quick review of the publicly available data, including the title of the data and the organization from which the data are available. To view more extensive details about the data, an EXCEL workbook ("Digital Data") has been provided. The EXCEL workbook includes several datasheets for each of the aforementioned data categories. Among some of the additional details provided in the EXCEL workbook are partial metadata, web addresses, and descriptions of the data. Blank fields within the EXCEL workbook represent information that were not readily available, but can be gathered at a later date with a more in depth search of the available metadata.

General Park Information

Spatial Extent
30.45N -88.37E 30.17S -89.01W, MS
30.44N -86.51E 30.25S -87.43W, FL
30.45N -86.51E 30.17S -89.01W, ALL

County
Jackson, MS
Harrison, MS
Escambia, FL
Okaloosa, FL
Santa Rosa, FL

Watershed	**HUC**
Mississippi Coastal, AL, MS	3170009
Perdido Bay, AL, FL	3140107
Pensacola Bay, FL	3140105

1:24,000 Quad	**Code**
Ship Island, MS	3088B8
Dog Keys Pass, MS	3088B7
Deer Island, MS	3088C7
Ocean Springs, MS	3088D7
Gautier South, MS	3088C6
Horn Island East, MS	3088B5
Horn Island West, MS	3088B6
Petit Bois Island, MS	3088B4
Perdido Bay, FL	30087c4
Fort Barrancas, FL	30087c3
Gulf Breeze, FL	30087c2
Oriole Beach, FL	30087c4
Holley, FL	30086d6
South of Holley, FL	30086c8
Pensacola, FL	30087d2
Navarre, FL	30086d7
Mary Esther, FL	30086d6
Fort Walton Beach, FL	30086d5
Garcon Point, FL	30087d1

1:100,000 Quad
Biloxi, MS
Penssacola, FL
Fort Walton Beach, FL

1:250,000 Quad
Mobile, AL
Pensacola, FL

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_1	MARIS	MARIS	Ship Island, MS	DRG	1:24,000	raster	
L_2	USGS	USGS	Ship Island, MS	DEM	1:24,000	raster	30 m
L_3	USGS	USGS	Ship Island, MS	DLG_Boundaries	1:24,000	Vector	
L_4	USGS	USGS	Ship Island, MS	DLG_Hydrography	1:24,000	Vector	
L_5	USGS	USGS	Ship Island, MS	DLG_Hypsography	1:24,000	Vector	
L_6	USGS	USGS	Ship Island, MS	DLG_ManMade Features	1:24,000	Vector	
L_7	USGS	USGS	Ship Island, MS	DLG_NonVeg Features	1:24,000	Vector	
L_8	USGS	USGS	Ship Island, MS	DLG_Public Lands	1:24,000	Vector	
L_9	USGS	USGS	Ship Island, MS	DLG_Surface Cover	1:24,000	Vector	
L_10	USGS	USGS	Ship Island, MS	DLG_Survey Control	1:24,000	Vector	
L_11	USGS	USGS	Ship Island, MS	DLG_Transportation	1:24,000	Vector	
L_12	MARIS	MARIS	Ship Island_NE, MS	DOQQ	1:12,000	raster	1 m
L_13	MARIS	MARIS	Ship Island_NW, MS	DOQQ	1:12,000	raster	1 m
L_14	MARIS	MARIS	Ship Island_SW, MS	DOQQ	1:12,000	raster	1 m
L_15	MARIS	MARIS	Ship Island_SE, MS	DOQQ	1:12,000	raster	1 m
L_16	USGS		Ship Island, MS	NWI Wetlands	1:24,000	Vector	
L_17	MARIS	MARIS	Dog Keys Pass, MS	DRG	1:24,000	raster	
L_18	USGS	USGS	Dog Keys Pass, MS	DEM	1:24,000	raster	30 m
L_19	USGS	USGS	Dog Keys Pass, MS	DLG_Boundaries	1:24,000	Vector	
L_20	USGS	USGS	Dog Keys Pass, MS	DLG_Hydrography	1:24,000	Vector	
L_21	USGS	USGS	Dog Keys Pass, MS	DLG_Hypsography	1:24,000	Vector	
L_22	USGS	USGS	Dog Keys Pass, MS	DLG_ManMade Features	1:24,000	Vector	
L_23	USGS	USGS	Dog Keys Pass, MS	DLG_NonVeg Features	1:24,000	Vector	
L_24	USGS	USGS	Dog Keys Pass, MS	DLG_Public Lands	1:24,000	Vector	
L_25	USGS	USGS	Dog Keys Pass, MS	DLG_Surface Cover	1:24,000	Vector	
L_26	USGS	USGS	Dog Keys Pass, MS	DLG_Survey Control	1:24,000	Vector	
L_27	USGS	USGS	Dog Keys Pass, MS	DLG_Transportation	1:24,000	Vector	
L_28	MARIS	MARIS	Dog Keys Pass_NE, MS	DOQQ	1:12,000	raster	1 m
L_29	MARIS	MARIS	Dog Keys Pass_NW, MS	DOQQ	1:12,000	raster	1 m
L_30	MARIS	MARIS	Dog Keys Pass_SW, MS	DOQQ	1:12,000	raster	1 m
L_31	MARIS	MARIS	Dog Keys Pass_SE, MS	DOQQ	1:12,000	raster	1 m
L_32	USGS		Dog Keys Pass, MS	NWI Wetlands	1:24,000	Vector	

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_33	MARIS	MARIS	Deer Island, MS	DRG	1:24,000	raster	
L_34	USGS	USGS	Deer Island, MS	DEM	1:24,000	raster	30 m
L_35	USGS	USGS	Deer Island, MS	DLG_Boundaries	1:24,000	Vector	
L_36	USGS	USGS	Deer Island, MS	DLG_Hydrography	1:24,000	Vector	
L_37	USGS	USGS	Deer Island, MS	DLG_Hypsography	1:24,000	Vector	
L_38	USGS	USGS	Deer Island, MS	DLG_ManMade Features	1:24,000	Vector	
L_39	USGS	USGS	Deer Island, MS	DLG_NonVeg Features	1:24,000	Vector	
L_40	USGS	USGS	Deer Island, MS	DLG_Public Lands	1:24,000	Vector	
L_41	USGS	USGS	Deer Island, MS	DLG_Surface Cover	1:24,000	Vector	
L_42	USGS	USGS	Deer Island, MS	DLG_Survey Control	1:24,000	Vector	
L_43	USGS	USGS	Deer Island, MS	DLG_Transportation	1:24,000	Vector	
L_44	MARIS	MARIS	Deer Island_NE, MS	DOQQ	1:12,000	raster	1 m
L_45	MARIS	MARIS	Deer Island_NW, MS	DOQQ	1:12,000	raster	1 m
L_46	MARIS	MARIS	Deer Island_SW, MS	DOQQ	1:12,000	raster	1 m
L_47	MARIS	MARIS	Deer Island_SE, MS	DOQQ	1:12,000	raster	1 m
L_48	USGS		Deer Island, MS	NWI Wetlands	1:24,000	Vector	
L_49	MARIS	MARIS	Ocean Springs, MS	DRG	1:24,000	raster	
L_50	USGS	USGS	Ocean Springs, MS	DEM	1:24,000	raster	30 m
L_51	USGS	USGS	Ocean Springs, MS	DLG_Boundaries	1:24,000	Vector	
L_52	USGS	USGS	Ocean Springs, MS	DLG_Hydrography	1:24,000	Vector	
L_53	USGS	USGS	Ocean Springs, MS	DLG_Hypsography	1:24,000	Vector	
L_54	USGS	USGS	Ocean Springs, MS	DLG_ManMade Features	1:24,000	Vector	
L_55	USGS	USGS	Ocean Springs, MS	DLG_NonVeg Features	1:24,000	Vector	
L_56	USGS	USGS	Ocean Springs, MS	DLG_Public Lands	1:24,000	Vector	
L_57	USGS	USGS	Ocean Springs, MS	DLG_Surface Cover	1:24,000	Vector	
L_58	USGS	USGS	Ocean Springs, MS	DLG_Survey Control	1:24,000	Vector	
L_59	USGS	USGS	Ocean Springs, MS	DLG_Transportation	1:24,000	Vector	
L_60	MARIS	MARIS	Ocean Springs_NE, MS	DOQQ	1:12,000	raster	1 m
L_61	MARIS	MARIS	Ocean Springs_NW, MS	DOQQ	1:12,000	raster	1 m
L_62	MARIS	MARIS	Ocean Springs_SW, MS	DOQQ	1:12,000	raster	1 m
L_63	MARIS	MARIS	Ocean Springs_SE, MS	DOQQ	1:12,000	raster	1 m
L_64	USGS		Ocean Springs, MS	NWI Wetlands	1:24,000	Vector	

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_65	MARIS	MARIS	Gautier South, MS	DRG	1:24,000	raster	
L_66	USGS	USGS	Gautier South, MS	DEM	1:24,000	raster	30 m
L_67	USGS	USGS	Gautier South, MS	DLG_Boundaries	1:24,000	Vector	
L_68	USGS	USGS	Gautier South, MS	DLG_Hydrography	1:24,000	Vector	
L_69	USGS	USGS	Gautier South, MS	DLG_Hypsography	1:24,000	Vector	
L_70	USGS	USGS	Gautier South, MS	DLG_ManMade Features	1:24,000	Vector	
L_71	USGS	USGS	Gautier South, MS	DLG_NonVeg Features	1:24,000	Vector	
L_72	USGS	USGS	Gautier South, MS	DLG_Public Lands	1:24,000	Vector	
L_73	USGS	USGS	Gautier South, MS	DLG_Surface Cover	1:24,000	Vector	
L_74	USGS	USGS	Gautier South, MS	DLG_Survey Control	1:24,000	Vector	
L_75	USGS	USGS	Gautier South, MS	DLG_Transportation	1:24,000	Vector	
L_76	MARIS	MARIS	Gautier South_NE, MS	DOQQ	1:12,000	raster	1 m
L_77	MARIS	MARIS	Gautier South_NW, MS	DOQQ	1:12,000	raster	1 m
L_78	MARIS	MARIS	Gautier South_SW, MS	DOQQ	1:12,000	raster	1 m
L_79	MARIS	MARIS	Gautier South_SE, MS	DOQQ	1:12,000	raster	1 m
L_80	USGS		Gautier South, MS	NWI Wetlands	1:24,000	Vector	
L_81	MARIS	MARIS	Horn Island West, MS	DRG	1:24,000	raster	
L_82	USGS	USGS	Horn Island West, MS	DEM	1:24,000	raster	30 m
L_83	USGS	USGS	Horn Island West, MS	DLG_Boundaries	1:24,000	Vector	
L_84	USGS	USGS	Horn Island West, MS	DLG_Hydrography	1:24,000	Vector	
L_85	USGS	USGS	Horn Island West, MS	DLG_Hypsography	1:24,000	Vector	
L_86	USGS	USGS	Horn Island West, MS	DLG_ManMade Features	1:24,000	Vector	
L_87	USGS	USGS	Horn Island West, MS	DLG_NonVeg Features	1:24,000	Vector	
L_88	USGS	USGS	Horn Island West, MS	DLG_Public Lands	1:24,000	Vector	
L_89	USGS	USGS	Horn Island West, MS	DLG_Surface Cover	1:24,000	Vector	
L_90	USGS	USGS	Horn Island West, MS	DLG_Survey Control	1:24,000	Vector	
L_91	USGS	USGS	Horn Island West, MS	DLG_Transportation	1:24,000	Vector	
L_92	MARIS	MARIS	Horn Island West_NE, MS	DOQQ	1:12,000	raster	1 m
L_93	MARIS	MARIS	Horn Island West_NW, MS	DOQQ	1:12,000	raster	1 m
L_94	MARIS	MARIS	Horn Island West_SW, MS	DOQQ	1:12,000	raster	1 m
L_95	MARIS	MARIS	Horn Island West_SE, MS	DOQQ	1:12,000	raster	1 m
L_96	USGS		Horn Island West, MS	NWI Wetlands	1:24,000	Vector	

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_97	MARIS	MARIS	Horn Island East, MS	DRG	1:24,000	raster	
L_98	USGS	USGS	Horn Island East, MS	DEM	1:24,000	raster	30 m
L_99	USGS	USGS	Horn Island East, MS	DLG_Boundaries	1:24,000	Vector	
L_100	USGS	USGS	Horn Island East, MS	DLG_Hydrography	1:24,000	Vector	
L_101	USGS	USGS	Horn Island East, MS	DLG_Hypsography	1:24,000	Vector	
L_102	USGS	USGS	Horn Island East, MS	DLG_ManMade Features	1:24,000	Vector	
L_103	USGS	USGS	Horn Island East, MS	DLG_NonVeg Features	1:24,000	Vector	
L_104	USGS	USGS	Horn Island East, MS	DLG_Public Lands	1:24,000	Vector	
L_105	USGS	USGS	Horn Island East, MS	DLG_Surface Cover	1:24,000	Vector	
L_106	USGS	USGS	Horn Island East, MS	DLG_Survey Control	1:24,000	Vector	
L_107	USGS	USGS	Horn Island East, MS	DLG_Transportation	1:24,000	Vector	
L_108	MARIS	MARIS	Horn Island East_NE, MS	DOQQ	1:12,000	raster	1 m
L_109	MARIS	MARIS	Horn Island East_NW, MS	DOQQ	1:12,000	raster	1 m
L_110	MARIS	MARIS	Horn Island East_SW, MS	DOQQ	1:12,000	raster	1 m
L_111	MARIS	MARIS	Horn Island East_SE, MS	DOQQ	1:12,000	raster	1 m
L_112	USGS		Horn Island East, MS	NWI Wetlands	1:24,000	Vector	
L_113	MARIS	MARIS	Petit Bois Island, MS	DRG	1:24,000	raster	
L_114	USGS	USGS	Petit Bois Island, MS	DEM	1:24,000	raster	30 m
L_115	USGS	USGS	Petit Bois Island, MS	DLG_Boundaries	1:24,000	Vector	
L_116	USGS	USGS	Petit Bois Island, MS	DLG_Hydrography	1:24,000	Vector	
L_117	USGS	USGS	Petit Bois Island, MS	DLG_Hypsography	1:24,000	Vector	
L_118	USGS	USGS	Petit Bois Island, MS	DLG_ManMade Features	1:24,000	Vector	
L_119	USGS	USGS	Petit Bois Island, MS	DLG_NonVeg Features	1:24,000	Vector	
L_120	USGS	USGS	Petit Bois Island, MS	DLG_Public Lands	1:24,000	Vector	
L_121	USGS	USGS	Petit Bois Island, MS	DLG_Surface Cover	1:24,000	Vector	
L_122	USGS	USGS	Petit Bois Island, MS	DLG_Survey Control	1:24,000	Vector	
L_123	USGS	USGS	Petit Bois Island, MS	DLG_Transportation	1:24,000	Vector	
L_124	MARIS	MARIS	Petit Bois Island_NE, MS	DOQQ	1:12,000	raster	1 m
L_125	MARIS	MARIS	Petit Bois Island_NW, MS	DOQQ	1:12,000	raster	1 m
L_126	MARIS	MARIS	Petit Bois Island_SW, MS	DOQQ	1:12,000	raster	1 m
L_127	MARIS	MARIS	Petit Bois Island_SE, MS	DOQQ	1:12,000	raster	1 m
L_128	USGS		Petit Bois Island, MS	NWI Wetlands	1:24,000	Vector	

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_129	MARIS	MARIS	Jackson County	DEM	1:24,000	raster	30 m
L_130	MARIS	MARIS	Jackson County	DEM	1:24,000	raster	10 m
L_131	MARIS	MSDEQ	Jackson County	Agricultural Chemical Sampling Sites		Vector	
L_132	MARIS	USBOC	Jackson County	Airport Runways	1:100,000	Vector	
L_133	MARIS	USBOC	Jackson County	Census Block Groups	1:100,000	Vector	
L_134	MARIS	USBOC	Jackson County	Census Block Numbering Areas	1:100,000	Vector	
L_135	MARIS	USBOC	Jackson County	Census Blocks	1:100,000	Vector	
L_136	MARIS	USBOC	Jackson County	County Border	1:100,000	Vector	
L_137	MARIS	USGS_DLG, MSDOT	Jackson County	County Roads and City Streets	1:100,000	Vector	
L_138	MARIS	USDA-SCS	Jackson County	County Soils	1:20,000	Vector	
L_139	MARIS	MSPUS	Jackson County	Electric Utility Service Areas	1:24,000 1:100,000	Vector	
L_140	MARIS	MSDWFP	Jackson County	Environmentally Sensitive Areas	1:24,000	Vector	
L_141	MARIS	TNVA/MSFC	Jackson County	Forest Industry Sites	1:24,000	Vector	
L_142	MARIS	MSPUS	Jackson County	Gas Utility Service Areas	1:24,000 1:100,000	Vector	
L_143	MARIS	USBOC, MSDECD	Jackson County	Inactive Railroads	1:100,000	Vector	
L_144	MARIS	USGS_DLG	Jackson County	Intermittent Streams	1:100,000	Vector	
L_145	MARIS	UMS-MSMRI	Jackson County	Natural Gas Pipelines	varies	Vector	
L_146	MARIS	USGS_DLG	Jackson County	Perennial Streams	1:100,000	Vector	
L_147	MARIS	DEQ	Jackson County	Permitted Wells	1:24,000	Vector	
L_148	MARIS	USGS_DLG, MSDOT	Jackson County	Primary Roads	1:100,000	Vector	
L_149	MARIS	USBOC, MSDECD	Jackson County	Railroads	1:100,000	Vector	
L_150	MARIS	DEQ	Jackson County	RCRIS Sites	1:24,000	Vector	
L_151	MARIS	USGS_DLG, MSDOT	Jackson County	Secondary Roads	1:100,000	Vector	
L_152	MARIS		Jackson County	Sections	1:24,000	Vector	

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_153	MARIS	MSPUS	Jackson County	Sewer Utility Service Areas	1:24,000 1:100,000	Vector	
L_154	MARIS	DEQ	Jackson County	Superfund Sites (CERCLA)	1:24,000	Vector	
L_155	MARIS	MSDEQ	Jackson County	Surface Geology	1:500,000	Vector	
L_156	MARIS	MSPUS	Jackson County	Telephone Utility Service Areas	1:24,000 1:100,000	Vector	
L_157	MARIS	MSEMA	Jackson County	Toxic Release Inventory	1:24,000	Vector	
L_158	MARIS	USBOC, USGS_DLG	Jackson County	Transmission Lines	1:100,000	Vector	
L_159	MARIS	USGS_DLG	Jackson County	USGS Land Use	1:250,000	Vector	
L_160	MARIS	USGS	Jackson County	USGS Private Wells	1:24,000	Vector	
L_161	MARIS	USGS	Jackson County	USGS Public Wells	1:24,000	Vector	
L_162	MARIS		Jackson County	Waste Treatment Impoundments		Vector	
L_163	MARIS	DEQ	Jackson County	Wastewater Discharge Sites	1:24,000	Vector	
L_164	MARIS	MSPUS	Jackson County	Water Utility Service Areas	1:24,000 1:100,000	Vector	
L_165	USDA/NRCS	NRCS	Jackson County	SSURGO - Soils		Vector	
L_166	USGS	FEMA	Jackson County	Q3 Flood Data		Vector	
L_167	USGS		Jackson County	Tiger/Line 2000		Vector	
L_168	USGS		Jackson County	Tiger/Line 2002		Vector	
L_169	MARIS	MARIS	Harrison County	DEM	1:24,000	raster	30 m
L_170	MARIS	MARIS	Harrison County	DEM	1:24,000	raster	10 m
L_171	MARIS	MSDEQ	Harrison County	Agricultural Chemical Sampling Sites		Vector	
L_172	MARIS	USBOC	Harrison County	Airport Runways	1:100,000	Vector	
L_173	MARIS	USBOC	Harrison County	Census Block Groups	1:100,000	Vector	
L_174	MARIS	USBOC	Harrison County	Census Block Numbering Areas	1:100,000	Vector	
L_175	MARIS	USBOC	Harrison County	Census Blocks	1:100,000	Vector	
L_176	MARIS	USBOC	Harrison County	County Border	1:100,000	Vector	
L_177	MARIS	USGS_DLG, MSDOT	Harrison County	County Roads and City Streets	1:100,000	Vector	
L_178	MARIS	USDA-SCS	Harrison County	County Soils	1:20,000	Vector	
L_179	MARIS	MSPUS	Harrison County	Electric Utility Service Areas	1:24,000 1:100,000	Vector	

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_180	MARIS	MSDWFP	Harrison County	Environmentally Sensitive Areas	1:24,000	Vector	
L_181	MARIS	TNVA/MSFC	Harrison County	Forest Industry Sites	1:24,000	Vector	
L_182	MARIS	MSPUS	Harrison County	Gas Utility Service Areas	1:24,000 1:100,000	Vector	
L_183	MARIS	USBOC, MSDECD	Harrison County	Inactive Railroads	1:100,000	Vector	
L_184	MARIS	USGS_DLG	Harrison County	Intermittent Streams	1:100,000	Vector	
L_185	MARIS	UMS-MSMRI	Harrison County	Natural Gas Pipelines	varies	Vector	
L_186	MARIS	USGS_DLG	Harrison County	Perennial Streams	1:100,000	Vector	
L_187	MARIS	DEQ	Harrison County	Permitted Wells	1:24,000	Vector	
L_188	MARIS	USGS_DLG, MSDOT	Harrison County	Primary Roads	1:100,000	Vector	
L_189	MARIS	USBOC, MSDECD	Harrison County	Railroads	1:100,000	Vector	
L_190	MARIS	DEQ	Harrison County	RCRIS Sites	1:24,000	Vector	
L_191	MARIS	USGS_DLG, MSDOT	Harrison County	Secondary Roads	1:100,000	Vector	
L_192	MARIS		Harrison County	Sections	1:24,000	Vector	
L_193	MARIS	MSPUS	Harrison County	Sewer Utility Service Areas	1:24,000 1:100,000	Vector	
L_194	MARIS	DEQ	Harrison County	Superfund Sites (CERCLA)	1:24,000	Vector	
L_195	MARIS	MSDEQ	Harrison County	Surface Geology	1:500,000	Vector	
L_196	MARIS	MSPUS	Harrison County	Telephone Utility Service Areas	1:24,000 1:100,000	Vector	
L_197	MARIS	MSEMA	Harrison County	Toxic Release Inventory	1:24,000	Vector	
L_198	MARIS	USBOC, USGS_DLG	Harrison County	Transmission Lines	1:100,000	Vector	
L_199	MARIS	USGS_DLG	Harrison County	USGS Land Use	1:250,000	Vector	
L_200	MARIS	USGS	Harrison County	USGS Private Wells	1:24,000	Vector	
L_201	MARIS	USGS	Harrison County	USGS Public Wells	1:24,000	Vector	
L_202	MARIS		Harrison County	Waste Treatment Impoundments		Vector	
L_203	MARIS	DEQ	Harrison County	Wastewater Discharge Sites	1:24,000	Vector	

MS_Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_204	MARIS	MSPUS	Harrison County	Water Utility Service Areas	1:24,000 1:100,000	Vector	
L_205	USDA/NRCS	NRCS	Harrison County	SSURGO - Soils		Vector	
L_206	USGS	FEMA	Harrison County	Q3 Flood Data		Vector	
L_207	USGS		Harrison County	Tiger/Line 2000		Vector	
L_208	USGS		Harrison County	Tiger/Line 2002		Vector	
L_209	USGS	EPA	Mobile 1:250,000 Quad	Composite Them Grid Format	1:250,000	raster	200 m
L_210	USGS	EPA	Mobile 1:250,000 Quad	Census County Subdivision	1:250,000	Vector	
L_211	USGS	EPA	Mobile 1:250,000 Quad	Federal Land	1:250,000	Vector	
L_212	USGS	EPA	Mobile 1:250,000 Quad	Hydrologic Units	1:250,000	Vector	
L_213	USGS	EPA	Mobile 1:250,000 Quad	Land Use/Land Cover	1:250,000	Vector	
L_214	USGS	EPA	Mobile 1:250,000 Quad	Political Units	1:250,000	Vector	
L_215	USGS	EPA	Mobile 1:250,000 Quad	State Land	1:250,000	Vector	
L_216	USGS		Biloxi_East 1:100,000 Quad	DLG	1:100,000	Vector	
L_217	USGS		Biloxi_West 1:100,000 Quad	DLG	1:100,000	Vector	
L_218	USGS		Biloxi 1:100,000 Quad	DRG	1:100,000	raster	
L_219	USGS		Mobile 1:250,000 Quad	DRG	1:250,000	raster	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_220	USGS	USGS	Perdido Bay, FL	DRG	1:24,000	raster	
L_221	USGS	USGS	Perdido Bay, FL	DEM	1:24,000	raster	30 m
L_222	USGS	USGS	Perdido Bay, FL	DLG_Boundaries	1:24,000	Vector	
L_223	USGS	USGS	Perdido Bay, FL	DLG_Hydrography	1:24,000	Vector	
L_224	USGS	USGS	Perdido Bay, FL	DLG_Hypsography	1:24,000	Vector	
L_225	USGS	USGS	Perdido Bay, FL	DLG_Public Lands	1:24,000	Vector	
L_226	USGS	USGS	Perdido Bay, FL	DLG_Transportation	1:24,000	Vector	
L_227	USGS	USGS	Perdido Bay_SE, FL	DOQQ_AL	1:12,000	raster	1 m
L_228	USGS	USGS	Perdido Bay_NE, FL	DOQQ_AL	1:12,000	raster	1 m
L_229	USGS		Perdido Bay, FL	NWI Wetlands	1:24,000	Vector	
L_230	USGS		Perdido Bay, FL	Pipelines	1:24,000	Vector	
L_231	USGS		Perdido Bay, FL	Railroads	1:24,000	Vector	
L_232	USGS		Perdido Bay, FL	Roads	1:24,000	Vector	
L_233	USGS		Perdido Bay, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_234	USGS	FDEP	Perdido Bay, FL	Hydrography	1:24,000	Vector	
L_235	USGS	NWI	Perdido Bay, FL	Hydrography	1:24,000	Vector	
L_236	USGS	NWFWMD	Perdido Bay, FL	Land Use/Land Cover	1:24,000	Vector	
L_237	USGS	USGS	Pensacola, FL	DRG	1:24,000	raster	
L_238	USGS	USGS	Pensacola, FL	DEM	1:24,000	raster	30 m
L_239	USGS	USGS	Pensacola, FL	DLG_Boundaries	1:24,000	Vector	
L_240	USGS	USGS	Pensacola, FL	DLG_Hydrography	1:24,000	Vector	
L_241	USGS	USGS	Pensacola, FL	DLG_Hypsography	1:24,000	Vector	
L_242	USGS	USGS	Pensacola, FL	DLG_Public Lands	1:24,000	Vector	
L_243	USGS	USGS	Pensacola _NE, _SE, _NW, _SW, FL	DOQQs	1:12,000	raster	1 m
L_244	USGS	USGS	Pensacola, FL	DLG_Transportation	1:24,000	Vector	
L_245	USGS		Pensacola, FL	NWI Wetlands	1:24,000	Vector	
L_246	USGS		Pensacola, FL	Pipelines	1:24,000	Vector	
L_247	USGS		Pensacola, FL	Railroads	1:24,000	Vector	
L_248	USGS		Pensacola, FL	Roads	1:24,000	Vector	
L_249	USGS		Pensacola, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_250	USGS	FDEP	Pensacola, FL	Hydrography	1:24,000	Vector	
L_251	USGS	NWI	Pensacola, FL	Hydrography	1:24,000	Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_252	USGS	NWFWMD	Pensacola, FL	Land Use/Land Cover	1:24,000	Vector	
L_253	USGS	USGS	Fort Barrancas, FL	DRG	1:24,000	raster	
L_254	USGS	USGS	Fort Barrancas, FL	DEM	1:24,000	raster	30 m
L_255	USGS	USGS	Fort Barrancas, FL	DLG_Boundaries	1:24,000	Vector	
L_256	USGS	USGS	Fort Barrancas, FL	DLG_Hydrography	1:24,000	Vector	
L_257	USGS	USGS	Fort Barrancas, FL	DLG_Hypsography	1:24,000	Vector	
L_258	USGS	USGS	Fort Barrancas, FL	DLG_Public Lands	1:24,000	Vector	
L_259	USGS	USGS	Fort Barrancas, FL	DLG_Transportation	1:24,000	Vector	
L_264	USGS		Fort Barrancas, FL	NWI Wetlands	1:24,000	Vector	
L_265	USGS		Fort Barrancas, FL	Pipelines	1:24,000	Vector	
L_266	USGS		Fort Barrancas, FL	Railroads	1:24,000	Vector	
L_267	USGS		Fort Barrancas, FL	Roads	1:24,000	Vector	
L_268	USGS		Fort Barrancas, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_269	USGS	FDEP	Fort Barrancas, FL	Hydrography	1:24,000	Vector	
L_270	USGS	NWI	Fort Barrancas, FL	Hydrography	1:24,000	Vector	
L_271	USGS	NWFWMD	Fort Barrancas, FL	Land Use/Land Cover	1:24,000	Vector	
L_272	USGS	USGS	Gulf Breeze, FL	DRG	1:24,000	raster	
L_273	USGS	USGS	Gulf Breeze, FL	DEM	1:24,000	raster	30 m
L_274	USGS	USGS	Gulf Breeze, FL	DLG_Boundaries	1:24,000	Vector	
L_275	USGS	USGS	Gulf Breeze, FL	DLG_Hydrography	1:24,000	Vector	
L_276	USGS	USGS	Gulf Breeze, FL	DLG_Hypsography	1:24,000	Vector	
L_277	USGS	USGS	Gulf Breeze, FL	DLG_Public Lands	1:24,000	Vector	
L_278	USGS	USGS	Gulf Breeze, FL	DLG_Transportation	1:24,000	Vector	
L_283	USGS		Gulf Breeze, FL	NWI Wetlands	1:24,000	Vector	
L_284	USGS		Gulf Breeze, FL	Pipelines	1:24,000	Vector	
L_285	USGS		Gulf Breeze, FL	Railroads	1:24,000	Vector	
L_286	USGS		Gulf Breeze, FL	Roads	1:24,000	Vector	
L_287	USGS		Gulf Breeze, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_288	USGS	FDEP	Gulf Breeze, FL	Hydrography	1:24,000	Vector	
L_289	USGS	NWI	Gulf Breeze, FL	Hydrography	1:24,000	Vector	
L_290	USGS	NWFWMD	Gulf Breeze, FL	Land Use/Land Cover	1:24,000	Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_291	USGS	USGS	Holley, FL	DRG	1:24,000	raster	
L_292	USGS	USGS	Holley, FL	DEM	1:24,000	raster	30 m
L_293	USGS	USGS	Holley, FL	DLG_Boundaries	1:24,000	Vector	
L_294	USGS	USGS	Holley, FL	DLG_Hydrography	1:24,000	Vector	
L_295	USGS	USGS	Holley, FL	DLG_Hypsography	1:24,000	Vector	
L_296	USGS	USGS	Holley, FL	DLG_Public Lands	1:24,000	Vector	
L_297	USGS	USGS	Holley, FL	DLG_Transportation	1:24,000	Vector	
L_298	USGS	USGS	Holley _NE, _SE, _NW, _SW, FL	DOQQs	1:12,000	raster	1 m
L_299	USGS		Holley, FL	NWI Wetlands	1:24,000	Vector	
L_300	USGS		Holley, FL	Pipelines	1:24,000	Vector	
L_301	USGS		Holley, FL	Railroads	1:24,000	Vector	
L_302	USGS		Holley, FL	Roads	1:24,000	Vector	
L_303	USGS		Holley, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_304	USGS	FDEP	Holley, FL	Hydrography	1:24,000	Vector	
L_305	USGS	NWI	Holley, FL	Hydrography	1:24,000	Vector	
L_306	USGS	NWFWMD	Holley, FL	Land Use/Land Cover	1:24,000	Vector	
L_307	USGS	USGS	Navarre, FL	DRG	1:24,000	raster	
L_308	USGS	USGS	Navarre, FL	DEM	1:24,000	raster	30 m
L_309	USGS	USGS	Navarre, FL	DLG_Boundaries	1:24,000	Vector	
L_310	USGS	USGS	Navarre, FL	DLG_Hydrography	1:24,000	Vector	
L_311	USGS	USGS	Navarre, FL	DLG_Hypsography	1:24,000	Vector	
L_312	USGS	USGS	Navarre, FL	DLG_Public Lands	1:24,000	Vector	
L_313	USGS	USGS	Navarre, FL	DLG_Transportation	1:24,000	Vector	
L_314	USGS	USGS	Navarre _NE, _SE, _NW, _SW, FL	DOQQs	1:12,000	raster	1 m
L_315	USGS		Navarre, FL	NWI Wetlands	1:24,000	Vector	
L_316	USGS		Navarre, FL	Pipelines	1:24,000	Vector	
L_317	USGS		Navarre, FL	Railroads	1:24,000	Vector	
L_318	USGS		Navarre, FL	Roads	1:24,000	Vector	
L_319	USGS		Navarre, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_320	USGS	FDEP	Navarre, FL	Hydrography	1:24,000	Vector	
L_321	USGS	NWI	Navarre, FL	Hydrography	1:24,000	Vector	
L_322	USGS	NWFWMD	Navarre, FL	Land Use/Land Cover	1:24,000	Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_323	USGS	USGS	Oriole Beach, FL	DRG	1:24,000	raster	
L_324	USGS	USGS	Oriole Beach, FL	DEM	1:24,000	raster	30 m
L_325	USGS	USGS	Oriole Beach, FL	DLG_Boundaries	1:24,000	Vector	
L_326	USGS	USGS	Oriole Beach, FL	DLG_Hydrography	1:24,000	Vector	
L_327	USGS	USGS	Oriole Beach, FL	DLG_Hypsography	1:24,000	Vector	
L_328	USGS	USGS	Oriole Beach, FL	DLG_Public Lands	1:24,000	Vector	
L_329	USGS	USGS	Oriole Beach, FL	DLG_Transportation	1:24,000	Vector	
L_332	USGS		Oriole Beach, FL	NWI Wetlands	1:24,000	Vector	
L_333	USGS		Oriole Beach, FL	Pipelines	1:24,000	Vector	
L_334	USGS		Oriole Beach, FL	Railroads	1:24,000	Vector	
L_335	USGS		Oriole Beach, FL	Roads	1:24,000	Vector	
L_336	USGS		Oriole Beach, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_337	USGS	FDEP	Oriole Beach, FL	Hydrography	1:24,000	Vector	
L_338	USGS	NWI	Oriole Beach, FL	Hydrography	1:24,000	Vector	
L_339	USGS	NWFWMD	Oriole Beach, FL	Land Use/Land Cover	1:24,000	Vector	
L_340	USGS	USGS	South of Holley, FL	DRG	1:24,000	raster	
L_341	USGS	USGS	South of Holley, FL	DEM	1:24,000	raster	30 m
L_342	USGS	USGS	South of Holley, FL	DLG_Boundaries	1:24,000	Vector	
L_343	USGS	USGS	South of Holley, FL	DLG_Hydrography	1:24,000	Vector	
L_344	USGS	USGS	South of Holley, FL	DLG_Hypsography	1:24,000	Vector	
L_345	USGS	USGS	South of Holley, FL	DLG_Public Lands	1:24,000	Vector	
L_346	USGS	USGS	South of Holley, FL	DLG_Transportation	1:24,000	Vector	
L_347	USGS	USGS	South of Holley _NE, _SE, _NW, _SW, FL	DOQQs	1:12,000	raster	1 m
L_348	USGS		South of Holley, FL	NWI Wetlands	1:24,000	Vector	
L_349	USGS		South of Holley, FL	Pipelines	1:24,000	Vector	
L_350	USGS		South of Holley, FL	Railroads	1:24,000	Vector	
L_351	USGS		South of Holley, FL	Roads	1:24,000	Vector	
L_352	USGS		South of Holley, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_353	USGS	FDEP	South of Holley, FL	Hydrography	1:24,000	Vector	
L_354	USGS	NWI	South of Holley, FL	Hydrography	1:24,000	Vector	
L_355	USGS	NWFWMD	South of Holley, FL	Land Use/Land Cover	1:24,000	Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_356	USGS	USGS	Garcon Point, FL	DRG	1:24,000	raster	
L_357	USGS	USGS	Garcon Point, FL	DEM	1:24,000	raster	30 m
L_358	USGS	USGS	Garcon Point, FL	DLG_Boundaries	1:24,000	Vector	
L_359	USGS	USGS	Garcon Point, FL	DLG_Hydrography	1:24,000	Vector	
L_360	USGS	USGS	Garcon Point, FL	DLG_Hypsography	1:24,000	Vector	
L_361	USGS	USGS	Garcon Point, FL	DLG_Public Lands	1:24,000	Vector	
L_362	USGS	USGS	Garcon Point, FL	DLG_Transportation	1:24,000	Vector	
L_363	USGS	USGS	Garcon Point _NE, _SE, _NW, _SW, FL	DOQQs	1:12,000	raster	1 m
L_364	USGS		Garcon Point, FL	NWI Wetlands	1:24,000	Vector	
L_365	USGS		Garcon Point, FL	Pipelines	1:24,000	Vector	
L_366	USGS		Garcon Point, FL	Railroads	1:24,000	Vector	
L_367	USGS		Garcon Point, FL	Roads	1:24,000	Vector	
L_368	USGS		Garcon Point, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_369	USGS	FDEP	Garcon Point, FL	Hydrography	1:24,000	Vector	
L_370	USGS	NWI	Garcon Point, FL	Hydrography	1:24,000	Vector	
L_371	USGS	NWFWMD	Garcon Point, FL	Land Use/Land Cover	1:24,000	Vector	
L_372	USGS	USGS	Mary Esther, FL	DRG	1:24,000	raster	
L_373	USGS	USGS	Mary Esther, FL	DEM	1:24,000	raster	30 m
L_374	USGS	USGS	Mary Esther, FL	DLG_Boundaries	1:24,000	Vector	
L_375	USGS	USGS	Mary Esther, FL	DLG_Hydrography	1:24,000	Vector	
L_376	USGS	USGS	Mary Esther, FL	DLG_Hypsography	1:24,000	Vector	
L_377	USGS	USGS	Mary Esther, FL	DLG_Public Lands	1:24,000	Vector	
L_378	USGS	USGS	Mary Esther, FL	DLG_Transportation	1:24,000	Vector	
L_379	USGS	USGS	Mary Esther _NE, _SE, _NW, _SW, FL	DOQQs	1:12,000	raster	1 m
L_380	USGS		Mary Esther, FL	NWI Wetlands	1:24,000	Vector	
L_381	USGS		Mary Esther, FL	Pipelines	1:24,000	Vector	
L_382	USGS		Mary Esther, FL	Railroads	1:24,000	Vector	
L_383	USGS		Mary Esther, FL	Roads	1:24,000	Vector	
L_384	USGS		Mary Esther, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_385	USGS	FDEP	Mary Esther, FL	Hydrography	1:24,000	Vector	
L_386	USGS	NWI	Mary Esther, FL	Hydrography	1:24,000	Vector	
L_387	USGS	NWFWMD	Mary Esther, FL	Land Use/Land Cover	1:24,000	Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_388	USGS	USGS	Fort Walton Beach, FL	DRG	1:24,000	raster	
L_389	USGS	USGS	Fort Walton Beach, FL	DEM	1:24,000	raster	30 m
L_390	USGS	USGS	Fort Walton Beach, FL	DLG_Boundaries	1:24,000	Vector	
L_391	USGS	USGS	Fort Walton Beach, FL	DLG_Hydrography	1:24,000	Vector	
L_392	USGS	USGS	Fort Walton Beach, FL	DLG_Hypsography	1:24,000	Vector	
L_393	USGS	USGS	Fort Walton Beach, FL	DLG_Public Lands	1:24,000	Vector	
L_394	USGS	USGS	Fort Walton Beach, FL	DLG_Transportation	1:24,000	Vector	
L_395	USGS	USGS	Fort Walton _NE, _SE, _NW, _SW, FL	DOQQs	1:12,000	raster	1 m
L_396	USGS		Fort Walton Beach, FL	NWI Wetlands	1:24,000	Vector	
L_397	USGS		Fort Walton Beach, FL	Pipelines	1:24,000	Vector	
L_398	USGS		Fort Walton Beach, FL	Railroads	1:24,000	Vector	
L_399	USGS		Fort Walton Beach, FL	Roads	1:24,000	Vector	
L_400	USGS		Fort Walton Beach, FL	USGS 24K Quad Boundaries	1:24,000	Vector	
L_401	USGS	FDEP	Fort Walton Beach, FL	Hydrography	1:24,000	Vector	
L_402	USGS	NWI	Fort Walton Beach, FL	Hydrography	1:24,000	Vector	
L_403	USGS	NWFWMD	Fort Walton Beach, FL	Land Use/Land Cover	1:24,000	Vector	
L_404	FGDL	FDEP	Escambia County	Drainage Basins		Vector	
L_405	FGDL	FDEP	Okaloosa County	Drainage Basins		Vector	
L_406	FGDL	FDEP	Santa Rosa County	Drainage Basins		Vector	
L_407	FGDL	FDEP	Escambia County	Drastic Coverage for the Floridan Aquifer System		Vector	
L_408	FGDL	FDEP	Okaloosa County	Drastic Coverage for the Floridan Aquifer System		Vector	
L_409	FGDL	FDEP	Santa Rosa County	Drastic Coverage for the Floridan Aquifer System		Vector	
L_410	FGDL	FDEP	Escambia County	Drastic Coverage for the Surficial Aquifer System		Vector	
L_411	FGDL	FDEP	Okaloosa County	Drastic Coverage for the Surficial Aquifer System		Vector	
L_412	FGDL	FDEP	Santa Rosa County	Drastic Coverage for the Surficial Aquifer System		Vector	
L_413	FGDL	EPA	Escambia County	EPA River Reach 3 Files		Vector	
L_414	FGDL	EPA	Okaloosa County	EPA River Reach 3 Files		Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_415	FGDL	EPA	Santa Rosa County	EPA River Reach 3 Files		Vector	
L_416	FGDL	FDEP	Escambia County	FDEP Total Maximum Daily Loads for Listed Waters		Vector	
L_417	FGDL	FDEP	Okaloosa County	FDEP Total Maximum Daily Loads for Listed Waters		Vector	
L_418	FGDL	FDEP	Santa Rosa County	FDEP Total Maximum Daily Loads for Listed Waters		Vector	
L_419	FGDL	FDEP	Escambia County	FDEP Watershed Planning and Coordination Water Quality Data		Vector	
L_420	FGDL	FDEP	Okaloosa County	FDEP Watershed Planning and Coordination Water Quality Data		Vector	
L_421	FGDL	FDEP	Santa Rosa County	FDEP Watershed Planning and Coordination Water Quality Data		Vector	
L_422	FGDL	FEMA	Escambia County	FEMA Flood Insurance Rate Maps 1996		Vector	
L_423	FGDL	FEMA	Okaloosa County	FEMA Flood Insurance Rate Maps 1996		Vector	
L_424	FGDL	FEMA	Santa Rosa County	FEMA Flood Insurance Rate Maps 1996		Vector	
L_425	FGDL	USCB	Escambia County	Florida County Boundaries - by County		Vector	
L_426	FGDL	USCB	Okaloosa County	Florida County Boundaries - by County		Vector	
L_427	FGDL	USCB	Santa Rosa County	Florida County Boundaries - by County		Vector	
L_428	FGDL	FCFWRU	Escambia County	Florida Land Cover		raster	
L_429	FGDL	FCFWRU	Okaloosa County	Florida Land Cover		raster	
L_430	FGDL	FCFWRU	Santa Rosa County	Florida Land Cover		raster	
L_431	FGDL	FNAI	Escambia County	FNAI Conservation Areas Zone A		Vector	
L_432	FGDL	FNAI	Okaloosa County	FNAI Conservation Areas Zone A		Vector	
L_433	FGDL	FNAI	Santa Rosa County	FNAI Conservation Areas Zone A		Vector	
L_434	FGDL	FNAI	Escambia County	FNAI Conservation Areas Zone B		Vector	
L_435	FGDL	FNAI	Okaloosa County	FNAI Conservation Areas Zone B		Vector	
L_436	FGDL	FNAI	Santa Rosa County	FNAI Conservation Areas Zone B		Vector	
L_437	FGDL	FNAI	Escambia County	FNAI Conservation Areas Zone C		Vector	
L_438	FGDL	FNAI	Okaloosa County	FNAI Conservation Areas Zone C		Vector	
L_439	FGDL	FNAI	Santa Rosa County	FNAI Conservation Areas Zone C		Vector	
L_440	FGDL	FDOT	Escambia County	Major Roads - by County		Vector	
L_441	FGDL	FDOT	Okaloosa County	Major Roads - by County		Vector	
L_442	FGDL	FDOT	Santa Rosa County	Major Roads - by County		Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_443	FGDL	USGS	Escambia County	National Hydrography Dataset -Lines - by County		Vector	
L_444	FGDL	USGS	Okaloosa County	National Hydrography Dataset -Lines - by County		Vector	
L_445	FGDL	USGS	Santa Rosa County	National Hydrography Dataset -Lines - by County		Vector	
L_446	FGDL	USGS	Escambia County	National Hydrography Dataset -Waterboodies - by County		Vector	
L_447	FGDL	USGS	Okaloosa County	National Hydrography Dataset -Waterboodies - by County		Vector	
L_448	FGDL	USGS	Santa Rosa County	National Hydrography Dataset -Waterboodies - by County		Vector	
L_449	FGDL	USFW	Escambia County	National Wetlands Inventory - Lines		Vector	
L_450	FGDL	USFW	Okaloosa County	National Wetlands Inventory - Lines		Vector	
L_451	FGDL	USFW	Santa Rosa County	National Wetlands Inventory - Lines		Vector	
L_452	FGDL	USFW	Escambia County	National Wetlands Inventory - Polygons		Vector	
L_453	FGDL	USFW	Okaloosa County	National Wetlands Inventory - Polygons		Vector	
L_454	FGDL	USFW	Santa Rosa County	National Wetlands Inventory - Polygons		Vector	
L_455	FGDL	FDEP	Escambia County	Northwest Florida 3WMD Land Use 1995		Vector	
L_456	FGDL	FDEP	Okaloosa County	Northwest Florida 3WMD Land Use 1995		Vector	
L_457	FGDL	FDEP	Santa Rosa County	Northwest Florida 3WMD Land Use 1995		Vector	
L_458	FGDL	FDEP	Escambia County	Pesticide Drastic Vulnerability Areas of the Floridan Aquifer System		Vector	
L_459	FGDL	FDEP	Okaloosa County	Pesticide Drastic Vulnerability Areas of the Floridan Aquifer System		Vector	
L_460	FGDL	FDEP	Santa Rosa County	Pesticide Drastic Vulnerability Areas of the Floridan Aquifer System		Vector	
L_461	FGDL	FDEP	Escambia County	Pesticide Drastic Vulnerability Areas of the Intermediate Aquifer System		Vector	
L_462	FGDL	FDEP	Okaloosa County	Pesticide Drastic Vulnerability Areas of the Intermediate Aquifer System		Vector	
L_463	FGDL	FDEP	Santa Rosa County	Pesticide Drastic Vulnerability Areas of the Intermediate Aquifer System		Vector	
L_464	FGDL	FDEP	Escambia County	Pesticide Drastic Vulnerability Areas of the Surficial Aquifer System		Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_465	FGDL	FDEP	Okaloosa County	Pesticide Drastic Vulnerability Areas of the Surficial Aquifer System		Vector	
L_466	FGDL	FDEP	Santa Rosa County	Pesticide Drastic Vulnerability Areas of the Surficial Aquifer System		Vector	
L_467	FGDL	UF	Escambia County	Point of Interest		Vector	
L_468	FGDL	UF	Okaloosa County	Point of Interest		Vector	
L_469	FGDL	UF	Santa Rosa County	Point of Interest		Vector	
L_470	FGDL	FREAC/WMDs	Escambia County	Public Land Survey System		Vector	
L_471	FGDL	FREAC/WMDs	Okaloosa County	Public Land Survey System		Vector	
L_472	FGDL	FREAC/WMDs	Santa Rosa County	Public Land Survey System		Vector	
L_473	FGDL	NRCS	Escambia County	Specific Soils		Vector	
L_474	FGDL	NRCS	Okaloosa County	Specific Soils		Vector	
L_475	FGDL	NRCS	Santa Rosa County	Specific Soils		Vector	
L_476	FGDL	SJWMD	Escambia County	St. Johns River WMD Land Use 1995		Vector	
L_477	FGDL	SJWMD	Okaloosa County	St. Johns River WMD Land Use 1995		Vector	
L_478	FGDL	SJWMD	Santa Rosa County	St. Johns River WMD Land Use 1995		Vector	
L_479	FGDL	USGS/FDEP	Escambia County	Streams		Vector	
L_480	FGDL	USGS/FDEP	Okaloosa County	Streams		Vector	
L_481	FGDL	USGS/FDEP	Santa Rosa County	Streams		Vector	
L_482	FGDL	SRWMD	Escambia County	Suwannee River Water Management District 1995 Land Use Update		Vector	
L_483	FGDL	SRWMD	Okaloosa County	Suwannee River Water Management District 1995 Land Use Update		Vector	
L_484	FGDL	SRWMD	Santa Rosa County	Suwannee River Water Management District 1995 Land Use Update		Vector	
L_485	FGDL	LP DAAC	Escambia County	Thematic Mapper 8 Bit False Color Satellite Images - 1999		raster	
L_486	FGDL	LP DAAC	Okaloosa County	Thematic Mapper 8 Bit False Color Satellite Images - 1999		raster	
L_487	FGDL	LP DAAC	Santa Rosa County	Thematic Mapper 8 Bit False Color Satellite Images - 1999		raster	
L_488	FGDL	EOSAT	Escambia County	Thematic Mapper 8 Bit False Color Satellite Images - 1992		raster	
L_489	FGDL	EOSAT	Okaloosa County	Thematic Mapper 8 Bit False Color Satellite Images - 1992		raster	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_490	FGDL	EOSAT	Santa Rosa County	Thematic Mapper 8 Bit False Color Satellite Images - 1992		raster	
L_491	FGDL	EOSAT	Escambia County	Thematic Mapper 8 Bit False Color Satellite Images - 1996		raster	
L_492	FGDL	EOSAT	Okaloosa County	Thematic Mapper 8 Bit False Color Satellite Images - 1996		raster	
L_493	FGDL	EOSAT	Santa Rosa County	Thematic Mapper 8 Bit False Color Satellite Images - 1996		raster	
L_494	FGDL	EOSAT	Escambia County	Thematic Mapper 8 Bit True Color Satellite Images - 1992		raster	
L_495	FGDL	EOSAT	Okaloosa County	Thematic Mapper 8 Bit True Color Satellite Images - 1992		raster	
L_496	FGDL	EOSAT	Santa Rosa County	Thematic Mapper 8 Bit True Color Satellite Images - 1992		raster	
L_497	FGDL	EOSAT	Escambia County	Thematic Mapper 8 Bit True Color Satellite Images - 1996		raster	
L_498	FGDL	EOSAT	Okaloosa County	Thematic Mapper 8 Bit True Color Satellite Images - 1996		raster	
L_499	FGDL	EOSAT	Santa Rosa County	Thematic Mapper 8 Bit True Color Satellite Images - 1996		raster	
L_500	FGDL	LP DAAC	Escambia County	Thematic Mapper 8 Bit True Color Satellite Images - 1999		raster	
L_501	FGDL	LP DAAC	Okaloosa County	Thematic Mapper 8 Bit True Color Satellite Images - 1999		raster	
L_502	FGDL	LP DAAC	Santa Rosa County	Thematic Mapper 8 Bit True Color Satellite Images - 1999		raster	
L_503	FGDL	LP DAAC	Escambia County	Thematic Mapper Panchromatic - 1999		raster	
L_504	FGDL	LP DAAC	Okaloosa County	Thematic Mapper Panchromatic - 1999		raster	
L_505	FGDL	LP DAAC	Santa Rosa County	Thematic Mapper Panchromatic - 1999		raster	
L_506	FGDL	USCB	Escambia County	Tiger Roads 100K	1:100,000	Vector	
L_507	FGDL	USCB	Okaloosa County	Tiger Roads 100K	1:100,000	Vector	
L_508	FGDL	USCB	Santa Rosa County	Tiger Roads 100K	1:100,000	Vector	
L_509	FGDL	USGS/WMDs	Escambia County	Topographic Five-foot Contour Lines		Vector	
L_510	FGDL	USGS/WMDs	Okaloosa County	Topographic Five-foot Contour Lines		Vector	
L_511	FGDL	USGS/WMDs	Santa Rosa County	Topographic Five-foot Contour Lines		Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_512	FGDL	USCB	Escambia County	US Census Bureau Tiger 100K Hydrography	1:100,000	Vector	
L_513	FGDL	USCB	Okaloosa County	US Census Bureau Tiger 100K Hydrography	1:100,000	Vector	
L_514	FGDL	USCB	Santa Rosa County	US Census Bureau Tiger 100K Hydrography	1:100,000	Vector	
L_515	FGDL	USGS	Escambia County	USGS 100K Hydrography - Lines	1:100,000	Vector	
L_516	FGDL	USGS	Okaloosa County	USGS 100K Hydrography - Lines	1:100,000	Vector	
L_517	FGDL	USGS	Santa Rosa County	USGS 100K Hydrography - Lines	1:100,000	Vector	
L_518	FGDL	USGS	Escambia County	USGS 100K Hydrography - Polygons	1:100,000	Vector	
L_519	FGDL	USGS	Okaloosa County	USGS 100K Hydrography - Polygons	1:100,000	Vector	
L_520	FGDL	USGS	Santa Rosa County	USGS 100K Hydrography - Polygons	1:100,000	Vector	
L_521	FGDL	USGS	Escambia County	USGS 24K Hydrography - Lines	1:24,000	Vector	
L_522	FGDL	USGS	Okaloosa County	USGS 24K Hydrography - Lines	1:24,000	Vector	
L_523	FGDL	USGS	Santa Rosa County	USGS 24K Hydrography - Lines	1:24,000	Vector	
L_524	FGDL	USGS	Escambia County	USGS 24K Hydrography - Polygons	1:24,000	Vector	
L_525	FGDL	USGS	Okaloosa County	USGS 24K Hydrography - Polygons	1:24,000	Vector	
L_526	FGDL	USGS	Santa Rosa County	USGS 24K Hydrography - Polygons	1:24,000	Vector	
L_527	FGDL	USGS	Escambia County	USGS 24K Roads	1:24,000	Vector	
L_528	FGDL	USGS	Okaloosa County	USGS 24K Roads	1:24,000	Vector	
L_529	FGDL	USGS	Santa Rosa County	USGS 24K Roads	1:24,000	Vector	
L_530	FGDL	USGS	Escambia County	USGS 250K Landuse/Land Cover from late 1970's/early 1980's	1:250,000	Vector	
L_531	FGDL	USGS	Okaloosa County	USGS 250K Landuse/Land Cover from late 1970's/early 1980's	1:250,000	Vector	
L_532	FGDL	USGS	Santa Rosa County	USGS 250K Landuse/Land Cover from late 1970's/early 1980's	1:250,000	Vector	
L_533	FGDL	USGS	Escambia County	USGS Geographic Names Information Systsem		Vector	
L_534	FGDL	USGS	Okaloosa County	USGS Geographic Names Information Systsem		Vector	
L_535	FGDL	USGS	Santa Rosa County	USGS Geographic Names Information Systsem		Vector	
L_536	FGDL	USGS	Escambia County	Waterstore Stream Flow Basin Characteristics		Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_537	FGDL	USGS	Okaloosa County	Waterstore Stream Flow Basin Characteristics		Vector	
L_538	FGDL	USGS	Santa Rosa County	Waterstore Stream Flow Basin Characteristics		Vector	
L_539	FGDL	USGS	Escambia County	USGS 24K DRGs	1:24,000	raster	
L_540	FGDL	USGS	Okaloosa County	USGS 24K DRGs	1:24,000	raster	
L_541	FGDL	USGS	Santa Rosa County	USGS 24K DRGs	1:24,000	raster	
L_542	FGDL	USGS	Escambia County	DOQQ - 1 m		raster	1 m
L_543	FGDL	USGS	Okaloosa County	DOQQ - 1 m		raster	1 m
L_544	FGDL	USGS	Santa Rosa County	DOQQ - 1 m		raster	1 m
L_545	FGDL	USGS	Escambia County	DOQQ - 3 m		raster	3 m
L_546	FGDL	USGS	Okaloosa County	DOQQ - 3 m		raster	3 m
L_547	FGDL	USGS	Santa Rosa County	DOQQ - 3 m		raster	3 m
L_548	FGDL	FDOT	Escambia County	FDOT Aerial Photography		raster	
L_549	FGDL	FDOT	Okaloosa County	FDOT Aerial Photography		raster	
L_550	FGDL	FDOT	Santa Rosa County	FDOT Aerial Photography		raster	
L_551	FGDL	USGS	Escambia County	Multi-Spectral Scanner Satellite Imagery - 1970's		raster	
L_552	FGDL	USGS	Okaloosa County	Multi-Spectral Scanner Satellite Imagery - 1970's		raster	
L_553	FGDL	USGS	Santa Rosa County	Multi-Spectral Scanner Satellite Imagery - 1970's		raster	
L_554	FGDL	USGS	Escambia County	Multi-Spectral Scanner Satellite Imagery - 1980's		raster	
L_555	FGDL	USGS	Okaloosa County	Multi-Spectral Scanner Satellite Imagery - 1980's		raster	
L_556	FGDL	USGS	Santa Rosa County	Multi-Spectral Scanner Satellite Imagery - 1980's		raster	
L_557	FGDL	USGS	Escambia County	Multi-Spectral Scanner Satellite Imagery - 1990's		raster	
L_558	FGDL	USGS	Okaloosa County	Multi-Spectral Scanner Satellite Imagery - 1990's		raster	
L_559	FGDL	USGS	Santa Rosa County	Multi-Spectral Scanner Satellite Imagery - 1990's		raster	
L_560	USDA/NRCS	NRCS	Escambia County	SSURGO - Soils		Vector	

FL_Local: by Quarter-Quad, Quad, or County

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_561	USDA/NRCS	NRCS	Santa Rosa County	SSURGO - Soils		Vector	
L_562	USGS	FEMA	Escambia County	Q3 Flood Data		Vector	
L_563	USGS	FEMA	Okaloosa County	Q3 Flood Data		Vector	
L_564	USGS	FEMA	Santa Rosa County	Q3 Flood Data		Vector	
L_565	USGS	USCB	Escambia County	Tiger/Line 2000		Vector	
L_566	USGS	USCB	Okaloosa County	Tiger/Line 2000		Vector	
L_567	USGS	USCB	Santa Rosa County	Tiger/Line 2000		Vector	
L_568	USGS	USCB	Escambia County	Tiger/Line 2002		Vector	
L_569	USGS	USCB	Okaloosa County	Tiger/Line 2002		Vector	
L_570	USGS	USCB	Santa Rosa County	Tiger/Line 2002		Vector	
L_571	USGS	EPA	Pensacola, FL 1:250,000 Quad	Composite Them Grid Format	1:250,000	raster	200 m
L_572	USGS	EPA	Pensacola, FL 1:250,000 Quad	Census County Subdivision	1:250,000	Vector	
L_573	USGS	EPA	Pensacola, FL 1:250,000 Quad	Federal Land	1:250,000	Vector	
L_574	USGS	EPA	Pensacola, FL 1:250,000 Quad	Hydrologic Units	1:250,000	Vector	
L_575	USGS	EPA	Pensacola, FL 1:250,000 Quad	Land Use/Land Cover	1:250,000	Vector	
L_576	USGS	EPA	Pensacola, FL 1:250,000 Quad	Political Units	1:250,000	Vector	
L_577	USGS	EPA	Pensacola, FL 1:250,000 Quad	State Land	1:250,000	Vector	
L_578	USGS	USGS	Fort Walton_East, FL 1:100,000 Quad	DLG	1:100,000	Vector	
L_579	USGS	USGS	Fort Walton_West, FL 1:100,000 Quad	DLG	1:100,000	Vector	
L_580	USGS	USGS	Pensacola, FL 1:100,000 Quad	DRG	1:100,000	raster	
L_581	USGS	USGS	Fort Walton, FL 1:100,000 Quad	DRG	1:100,000	raster	
L_582	USGS	USGS	Pensacola, FL 1:250,000 Quad	DRG	1:250,000	raster	

MS & FL_Local: by Watershed and decimal degree spatial extent of full park

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_583	USGS	USGS/EPA	Mississippi Coastal, AL, MS	NHD		Vector	
L_584	USGS	USGS/EPA	Perdido Bay, AL, FL	NHD		Vector	
L_585	USGS	USGS/EPA	Pensacola Bay, FL	NHD		Vector	
L_586	USGS The National Map		30.45N 86.51E 30.17S 89.01W	MODIS NDVI day 1		raster	1 km
L_587	USGS The National Map		30.45N 86.51E 30.17S 89.01W	MODIS NDVI day 2		raster	1 km
L_588	USGS The National Map		30.45N 86.51E 30.17S 89.01W	MODIS NDVI day 3		raster	1 km
L_589	USGS The National Map		30.45N 86.51E 30.17S 89.01W	MODIS NDVI day 4		raster	1 km
L_590	USGS The National Map		30.45N 86.51E 30.17S 89.01W	MODIS NDVI day 5		raster	1 km
L_591	USGS The National Map		30.45N 86.51E 30.17S 89.01W	MODIS NDVI day 6		raster	1 km
L_592	USGS The National Map		30.45N 86.51E 30.17S 89.01W	MODIS NDVI day 7		raster	1 km
L_593	USGS The National Map		30.45N 86.51E 30.17S 89.01W	NED		raster	10 m
L_594	USGS The National Map		30.45N 86.51E 30.17S 89.01W	NED		raster	30 m
L_595	USGS The National Map		30.45N 86.51E 30.17S 89.01W	NLCD		raster	30 m
L_596	USGS The National Map		30.45N 86.51E 30.17S 89.01W	SRTM		raster	30 m
L_597	USGS The National Map		30.45N 86.51E 30.17S 89.01W	SRTM		raster	90 m
L_598	NOAA/CSC		31.96N 86.61E 28.55S 89.51W	LIDAR_AL		raster	5 m or choice of cell size and units (m or ft) or contour intervals
L_599	NOAA/CSC		31.95N 85.64E 28.56S 89.51W	LIDAR_MS		raster	5 m or choice of cell size and units (m or ft) or contour intervals
L_600	NOAA/CSC		32.39N 80.51E 25.28S 88.64W	LIDAR_FL		raster	5 m or choice of cell size and units (m or ft) or contour intervals

Statewide_MS

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_1	USFS	USFS	13 state region (including MS)	LAA - Assessment Projects by watershed		Vector	
S_2	USFS	USFS	13 state region (including MS)	LAA - Assessment Projects by county		Vector	
S_3	USFS	USFS	13 state region (including MS)	LAA - Assessment Projects by ecoregion		Vector	
S_4	USFS	USFS	Mississippi	LAA - Forest Area Density		Raster	30 m
S_5	USFS	USFS	Mississippi	LAA - Forest Area Connectivity		Raster	30 m
S_6	USFS	USFS	Mississippi	LAA - Forest Fragmentation Index		Raster	30 m
S_7	USFS	USFS	Mississippi	LAA - Human Use Index		Raster	30 m
S_8	USFS	USFS	Mississippi	LAA - Land Cover Diversity		Raster	30 m
S_9	USFS	USFS	Mississippi	LAA - Land Cover Contagion		Raster	30 m
S_10	USFS	USFS	Mississippi	LAA - Landscape Pattern Type Index A		Raster	30 m
S_11	USGS	USGS	Mississippi	National Land Cover		raster	30 m
S_12	USGS	USGS	Mississippi	GAP		raster	
S_13	USDA/NRCS	NRCS	Mississippi	STATSGO - Soils	1:250,000	Vector	
S_14	MARIS	MARIS	Mississippi	7.5 minute Quadrangle Grid	1:24,000	Vector	
S_15	MARIS	MARIS	Mississippi	Lat/Long Grid		Vector	
S_16	MARIS	NGS	Mississippi	MS High Accuracy Network Sites		Vector	
S_17	MARIS	USGS	Mississippi	Survey Districts	1:24,000	Vector	
S_18	MARIS	USGS	Mississippi	Townships	1:24,000	Vector	
S_19	MARIS	USBOC	Mississippi	1990 Block Groups	1:100,000	Vector	
S_20	MARIS	USBOC	Mississippi	1990 Block Numbering Areas/Tracts	1:100,000	Vector	
S_21	MARIS	USBOC	Mississippi	2000 Block Groups	1:100,000	Vector	
S_22	MARIS	USBOC	Mississippi	2000 Block Numbering Areas/Tracts	1:100,000	Vector	
S_23	MARIS	USBOC	Mississippi	2000 Blocks	1:100,000	Vector	
S_24	MARIS	USBOC, MSDECD	Mississippi	Abandoned Railroads	1:100,000	Vector	
S_25	MARIS	USBOC, MSDECD	Mississippi	Active Railroads	1:100,000	Vector	
S_26	MARIS	USBOC	Mississippi	Airport Runways	1:100,000	Vector	
S_27	MARIS		Mississippi	County Roads		Vector	
S_28	MARIS	USGS_DLG, MSDOT	Mississippi	Primary Roads	1:100,000	Vector	
S_29	MARIS	USGS_DLG, MSDOT	Mississippi	Secondary Roads	1:100,000	Vector	
S_30	MARIS		Mississippi	Major Power Company Regions		Vector	
S_31	MARIS	UMS-MSMRI	Mississippi	Natural Gas Pipelines	varies	Vector	
S_32	MARIS	USBOC, USGS_DLG	Mississippi	Transmission Lines	1:100,000	Vector	

Statewide_MS

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_33	MARIS	MSBCI	Mississippi	Choctaw Indian Boundaries	1:24,000	Vector	
S_34	MARIS	USBOC	Mississippi	County Borders	1:100,000	Vector	
S_35	MARIS	MSIHL	Mississippi	Multi-County Industrial Districts	1:100,000	Vector	
S_36	MARIS	MSDWFP	Mississippi	National Wildlife Refuges	1:100,000	Vector	
S_37	MARIS	MSIHL	Mississippi	Planning and Development Districts	1:100,000	Vector	
S_38	MARIS	MSIHL	Mississippi	Public Service Commission Districts	1:100,000	Vector	
S_39	MARIS		Mississippi	State Outline		Vector	
S_40	MARIS	USACE	Mississippi	US Corps of Engineers Districts	1:100,000	Vector	
S_41	MARIS	MSDWFP	Mississippi	Wildlife Management Areas	1:100,000	Vector	
S_42	MARIS	USDA	Mississippi	Catfish Ponds	1:100,000	Vector	
S_43	MARIS	MSDEQ	Mississippi	Dam Locations	1:24,000	Vector	
S_44	MARIS	DEQ	Mississippi	Detailed Coastline	1:10,000	Vector	
S_45	MARIS		Mississippi	Discharge Elimination Sites		Vector	
S_46	MARIS	USDA_SCS	Mississippi	Hydrologic Units (Basins)	1:250,000	Vector	
S_47	MARIS	USGS_DLG	Mississippi	Intermittent Streams	1:100,000	Vector	
S_48	MARIS	USGS_DLG	Mississippi	Major Rivers	1:100,000	Vector	
S_49	MARIS	USGS_DLG	Mississippi	Mississippi River	1:100,000	Vector	
S_50	MARIS	MSDH	Mississippi	MS Dept. of Health Wells	1:24,000	Vector	
S_51	MARIS		Mississippi	MS Office of Land and Water Resource Permit Wells		Vector	
S_52	MARIS	USGS_DLG	Mississippi	Perennial Streams	1:100,000	Vector	
S_53	MARIS		Mississippi	Polygon Water GT 25 Acres		Vector	
S_54	MARIS		Mississippi	Surface Impoundment Sites		Vector	
S_55	MARIS	USGS	Mississippi	USGS Private Wells	1:24,000	Vector	
S_56	MARIS	USGS	Mississippi	USGS Public Wells	1:24,000	Vector	
S_57	MARIS	MSDECD	Mississippi	Water Development Districts	1:100,000	Vector	
S_58	MARIS	SCS	Mississippi	Watersheds	1:100,000	Vector	
S_59	MARIS	DEQ	Mississippi	Wellhead Protection Areas	1:24,000	Vector	
S_60	MARIS	MSDWFP	Mississippi	Environmentally Sensitive Areas	1:24,000	Vector	
S_61	MARIS	USDA-FS	Mississippi	Historic Forest Boundaries (1820-1920)	1:1,584,000	Vector	
S_62	MARIS	USDA-SCS	Mississippi	Major Land Resource Areas	1:250,000	Vector	
S_63	MARIS	MSU	Mississippi	MS Forest Habitats	1:500,000	Vector	
S_64	MARIS	MARIS	Mississippi	Physiographic Regions	1:250,000	Vector	
S_65	MARIS	USGS-SCS	Mississippi	Soil Associations	1:250,000	Vector	
S_66	MARIS	MSDEQ	Mississippi	Surface Geology	1:500,000	Vector	
S_67	MARIS		Mississippi	EPA Regulated Facilities		Vector	

Statewide_MS

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_68	MARIS	TNVA/MSFC	Mississippi	MS Forest Industry Sites	1:24,000	Vector	
S_69	MARIS	USFS	Mississippi	National Forest Boundaries	1:24,000	Vector	
S_70	MARIS	USFS	Mississippi	National Forest Ownership Boundaries	1:24,000	Vector	
S_71	MARIS	USGS	Mississippi	National Parks	1:24,000	Vector	
S_72	MARIS		Mississippi	National Registry Sites		Vector	
S_73	MARIS	DEQ	Mississippi	RCRA Sites	1:24,000	Vector	
S_74	MARIS		Mississippi	Recreational Facilities		Vector	
S_75	MARIS	MSDWFP	Mississippi	State Parks	1:24,000	Vector	
S_76	MARIS	MSEMA	Mississippi	Toxic Release Inventory Sites	1:24,000	Vector	
S_77	MARIS	MARIS	Mississippi	Underground Storage Tanks	1:100,000	Vector	
S_78	MARIS	MSDEQ	Mississippi	Agricultural Chemical Sampling Sites		Vector	
S_79	MARIS	USBOC	Mississippi	Census Block Groups	1:100,000	Vector	
S_80	MARIS	USBOC	Mississippi	Census Block Numbering Areas	1:100,000	Vector	
S_81	MARIS	USGS_DLG	Mississippi	Water Bodies	1:100,000	Vector	
S_82	MARIS	DEQ	Mississippi	Permitted Wells	1:24,000	Vector	
S_83	MARIS	DEQ	Mississippi	Superfund Sites (CERCLA)	1:24,000	Vector	
S_84	MARIS	DEQ	Mississippi	Wastewater Discharge Sites	1:24,000	Vector	
S_85	MARIS	USGS_DLG, MSDOT	Mississippi	County Roads & City Streets	1:100,000	Vector	
S_86	MARIS		Mississippi	Waste Treatment Impoundments		Vector	
S_87	USGS		Mississippi	Cultural Landmarks - lines		Vector	
S_88	USGS		Mississippi	Cultural Landmarks - points		Vector	
S_89	USGS		Mississippi	Populated Places-points		Vector	
S_90	USGS		Mississippi	Populated Places-polygon		Vector	
S_91	USGS	NRCS	Mississippi	STATSGO - Soils		Vector	
S_92	USGS		Mississippi	Physiography- lines		Vector	
S_93	USGS		Mississippi	Hydrography_drainage-network		Vector	
S_94	USGS		Mississippi	Hydrography_drainage-points		Vector	
S_95	USGS		Mississippi	Hydrography_drainage supplemental-points		Vector	
S_96	USGS		Mississippi	Hydrography_Ocean Features-lines		Vector	
S_97	USGS		Mississippi	Hypsography network		Vector	
S_98	USGS		Mississippi	Hypsography points		Vector	
S_99	USGS		Mississippi	Hypsography Supplemental lines		Vector	
S_100	USGS		Mississippi	Hypsography Supplemental points		Vector	
S_101	USGS		Mississippi	Land Cover - points		Vector	

Statewide_MS

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_102	USGS		Mississippi	Land Cover - polygons		Vector	
S_103	USGS		Mississippi	Transportation_aeronautical points		Vector	
S_104	USGS		Mississippi	Transportation_railroad-lines		Vector	
S_105	USGS		Mississippi	Transportation_roads-lines		Vector	
S_106	USGS		Mississippi	Transportation_structure-lines		Vector	
S_107	USGS		Mississippi	Utilities-lines		Vector	
S_108	USGS		Mississippi	Vegetation-polygons		Vector	

Statewide_FL

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_109	USFS	USFS	Florida	LAA - Forest Area Density		Raster	30 m
S_110	USFS	USFS	Florida	LAA - Forest Area Connectivity		Raster	30 m
S_111	USFS	USFS	Florida	LAA - Forest Fragmentation Index		Raster	30 m
S_112	USFS	USFS	Florida	LAA - Human Use Index		Raster	30 m
S_113	USFS	USFS	Florida	LAA - Land Cover Diversity		Raster	30 m
S_114	USFS	USFS	Florida	LAA - Land Cover Contagion		Raster	30 m
S_115	USFS	USFS	Florida	LAA - Landscape Pattern Type Index A		Raster	30 m
S_116	USGS	USGS	Florida	National Land Cover Data		raster	30 m
S_117	USGS	USGS	Florida	GAP		raster	
S_118	USDA/NRCS	NRCS	Florida	STATSGO (Soils)	1:250,000	Vector	
S_119	FGDL	USGS	Florida	Agricultural Chemical Use, Land Use, and Cropping Practice		Vector	
S_120	FGDL	USGS	Florida	Agricultural Cropping Practices Estimates		Vector	
S_121	FGDL	NOAA	Florida_Coast	Average Annual Salinity		Vector	
S_122	FGDL	NOAA	Florida_Coast	Bathymetric Contours		Vector	
S_123	FGDL	USGS	Florida	Breeding Bird Survey Route Locations		Vector	
S_124	FGDL	FDEP	Florida	Brownfield Location Boundaries		Vector	
S_125	FGDL	FDEP	Florida	Brownfield Point Locations		Vector	
S_126	FGDL	USGS	Florida	Cities and Towns		Vector	
S_127	FGDL	USGS	Florida	City Limits		Vector	
S_128	FGDL	NOAA	Florida_Coast	Coastal Assessment Framework		Vector	
S_129	FGDL	FEMA	Florida_Coast	Coastal Emergency Management Flood Data		Vector	
S_130	FGDL	NOAA	Florida_Coast	Coastal Hazards		Vector	
S_131	FGDL	UF	Florida	Conservation and Recreation Lands		Vector	
S_132	FGDL	NOAA	Florida_Coast	Continental Shelf		Vector	
S_133	FGDL	FDEP	Florida	County Boundaries with Detailed Shoreline		Vector	
S_134	FGDL	USCB	Florida	County Demographics		Vector	
S_135	FGDL	FDEP	Florida	Cross Florida Barge Canal Structures		Vector	
S_136	FGDL	NOAA	Florida_Coast	Danger Zones and Restricted Areas		Vector	
S_137	FGDL	NOAA	Florida_Coast	Data Buoys in the State of Florida		Vector	
S_138	FGDL	FMRI	Florida_Coast	Deep Bathymetry Off Florida Coasts		Vector	
S_139	FGDL	FDEP	Florida	DEP Ambient Air Monitoring Sites		Vector	
S_140	FGDL	FDEP	Florida	DEP Ecosystem Management Areas		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_141	FGDL	FDEP	Florida	DEP Restoration Inventory- Lines		Vector	
S_142	FGDL	FDEP	Florida	DEP Restoration Inventory- Points		Vector	
S_143	FGDL	FDEP	Florida	DEP Restoration Inventory- Polygons		Vector	
S_144	FGDL	UF	Florida	DOT Aerial Photos Index		Vector	
S_145	FGDL	FDEP	Florida	Drastic Coverage for Intermediate Aquifer		Vector	
S_146	FGDL	FDEP	Florida	Ecological Regions of Similarity		Vector	
S_147	FGDL	FDEP	Florida	Environmental Geology of Florida		Vector	
S_148	FGDL	EPA	Florida	EPA Toxic Release Inventory		Vector	
S_149	FGDL	EPA	Florida	EPA Water Quality Data		Vector	
S_150	FGDL	USGS	Florida	Estimates of Nitrogen and Phosphorus Content of Animal Wastes		Vector	
S_151	FGDL	Varied	Florida	Existing Recreational Trails		Vector	
S_152	FGDL	FDEP	Florida	FDEP Generalized Well Information System		Vector	
S_153	FGDL	FDEP	Florida	FDEP Mitigation Banks		Vector	
S_154	FGDL	FDEP	Florida	FDEP Regulatory Districts		Vector	
S_155	FGDL	FDOT	Florida	FDOT 1997 Traffic Meter Data		Vector	
S_156	FGDL	FDOT	Florida	FDOT District Boundaries		Vector	
S_157	FGDL	FDOT	Florida	FDOT Road Characteristics - Bridges		Vector	
S_158	FGDL	FDOT	Florida	FDOT Road Characteristics Inventory - Functional Road Classifications		Vector	
S_159	FGDL	FDOT	Florida	FDOT Road Characteristics Inventory - Outside Shoulders		Vector	
S_160	FGDL	FDOT	Florida	FDOT Road Characteristics Inventory - Inside Shoulders		Vector	
S_161	FGDL	FDOT	Florida	Federal Aviation Administration Obstructions		Vector	
S_162	FGDL	BAR	Florida	Field Survey Project Boundaries and Attributes		Vector	
S_163	FGDL	FDEP	Florida	First Magnetic Springs		Vector	
S_164	FGDL	FFWCC	Florida	Fish and Wildlife Conservation Commission Management Areas		Vector	
S_165	FGDL	BTS	Florida	Fixed-Guideway Transit Network		Vector	
S_166	FGDL	FMRI	Florida_Coast	Florida Aquatic Preserve Boundaries		Vector	
S_167	FGDL	FMRI	Florida_Coast	Florida Beach Names		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_168	FGDL	FMRI	Florida_Coast	Florida Coastline including Estuaries and Tidal Rivers		Vector	
S_169	FGDL	FMRI	Florida_Coast	Florida Coral Patches		Vector	
S_170	FGDL	NOAA	Florida_Coast	Florida Coral Reefs		Vector	
S_171	FGDL	USCB	Florida	Florida County Boundaries - Statewide		Vector	
S_172	FGDL	FMRI	Florida	US Coast Guard Districts		Vector	
S_173	FGDL	USGS	Florida	Florida Fire Departments		Vector	
S_174	FGDL	FFWCC	Florida	Florida Fish and Wildlife Conservation Commission Regional Boundaries		Vector	
S_175	FGDL	USFS	Florida	Florida Forest Inventory and Analysis		Vector	
S_176	FGDL	FMRI	Florida_Coast	Florida Keys Coral Platforms		Vector	
S_177	FGDL	USFWS	Florida_Coast	Florida Mangroves		Vector	
S_178	FGDL	FMRI	Florida_Coast	Florida Marine Facilities		Vector	
S_179	FGDL	FMRI	Florida_Coast	Florida National Estuarine Research Reserves		Vector	
S_180	FGDL	BTS	Florida	Florida National Highway Planning Network		Vector	
S_181	FGDL	USFS	Florida	Florida national Scenic Trail Planning Area		Vector	
S_182	FGDL	NOAA	Florida	Florida National Wildlife Refuges		Vector	
S_183	FGDL	FNAI	Florida	Florida Natural Areas Inventory Element Occurrence by Quad		Vector	
S_184	FGDL	FNAI	Florida	Florida Natural Areas Inventory Managed Areas		Vector	
S_185	FGDL	FMRI	Florida_Coast	Florida Reef Locations and Names		Vector	
S_186	FGDL	FMRI	Florida_Coast	Florida Sea Grass Bed Scar Damage		Vector	
S_187	FGDL	FMRI	Florida	Florida State Parks		Vector	
S_188	FGDL	FMRI	Florida	Florida Wildlife Management Areas		Vector	
S_189	FGDL	FDEP	Florida_Coast	Florida's Artificial Reefs		Vector	
S_190	FGDL	FMRI	Florida_Coast	Florida's Environmentally Sensitive Shorelines		Vector	
S_191	FGDL	USFS	Florida	Forest Density - grid		raster	
S_192	FGDL	USFS	Florida	Forestry Type - grid		raster	
S_193	FGDL	USFS	Florida	Forest Types of 1934		Vector	
S_194	FGDL	USDA	Florida	General Soil - STATSGO		Vector	
S_195	FGDL	FFWCC	Florida	GFC Biodiversity Hot Spots - grid		raster	
S_196	FGDL	FFWCC	Florida	GFC Habitat and Landcover - grid		raster	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_197	FGDL	FFWCC	Florida	GFC Priority Wetland Habitats - grid		raster	
S_198	FGDL	FFWCC	Florida	GFC Strategic habitat Conservation Areas - grid		raster	
S_199	FGDL	UF	Florida	Greenways Project: Cultural and Historic Features		Vector	
S_200	FGDL	UF	Florida	Greenways Project: Ecological Network Model Results		Vector	
S_201	FGDL	UF	Florida	Greenways Project: Ecological Network Model Results modified by Public Comment		Vector	
S_202	FGDL	UF	Florida	Greenways Project: Equestrian Trailheads		Vector	
S_203	FGDL	UF	Florida	Greenways Project: Equestrian Trailheads modified by Public Comment		Vector	
S_204	FGDL	UF	Florida	Greenways Project: Equestrian Trails		Vector	
S_205	FGDL	UF	Florida	Greenways Project: Equestrian Trails modified by Public Comment		Vector	
S_206	FGDL	UF	Florida	Greenways Project: Equestrian Trails modified by Public Comment and Private Landowner Comment		Vector	
S_207	FGDL	UF	Florida	Greenways Project: Hiking Trailheads		Vector	
S_208	FGDL	UF	Florida	Greenways Project: Hiking Trailheads modified by Public Comment		Vector	
S_209	FGDL	UF	Florida	greenways Project: Hiking Trails		Vector	
S_210	FGDL	UF	Florida	Greenways Project: Hiking Trails modified by Public Comment		Vector	
S_211	FGDL	UF	Florida	Greenways Project: Hiking Trails modified by Public Comment and Private Landowner Comment		Vector	
S_212	FGDL	UF	Florida	Greenways Project: Multi-use Trailheads		Vector	
S_213	FGDL	UF	Florida	Greenways Project: Multi-use Trailheads modified by Public Comment		Vector	
S_214	FGDL	UF	Florida	Greenways Project: Multi-use Trails		Vector	
S_215	FGDL	UF	Florida	Greenways Project: Multi-use Trails modified by Public Comment		Vector	
S_216	FGDL	UF	Florida	Greenways Project: Multi-use Trails modified by Public Comment and Private Landowner Comment		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_217	FGDL	UF	Florida	Greenways Project: Off-road Bicycling Trailheads		Vector	
S_218	FGDL	UF	Florida	Greenways Project: Off-road Bicycling Trailheads modified by Public Comment		Vector	
S_219	FGDL	UF	Florida	Greenways Project: Off-road Bicycling Trails		Vector	
S_220	FGDL	UF	Florida	Greenways Project: Off-road Bicycling Trails modified by Public Comment		Vector	
S_221	FGDL	UF	Florida	Greenways Project: Off-road Bicycling Trails modified by Public Comment and Private Landowner Comment		Vector	
S_222	FGDL	UF	Florida	Greenways Project: Paddling Trail Access Points		Vector	
S_223	FGDL	UF	Florida	Greenways Project: Paddling Trails		Vector	
S_224	FGDL	UF	Florida	Greenways Project: Priority Ecological Areas (After Exclusion of Incompatible Areas)		raster	
S_225	FGDL	UF	Florida	Greenways Trails Prioritization Project Biking Trails Priorities		Vector	
S_226	FGDL	UF	Florida	Greenways Trails Prioritization Project Hiking Trails Priorities		Vector	
S_227	FGDL	UF	Florida	Greenways Trails Prioritization Project Multi-use Trails Priorities		Vector	
S_228	FGDL	UF	Florida	Greenways Trails prioritization Project Paddling		Vector	
S_229	FGDL	FDOT	Florida	Hazardous Material Sites 1997		Vector	
S_230	FGDL	FDEM	Florida	Highway Mile Marker Locations		Vector	
S_231	FGDL	FDEM	Florida	Highway Public Rest Areas		Vector	
S_232	FGDL	BAR	Florida	Historic Bridges		Vector	
S_233	FGDL	BAR	Florida	Historic Cemeteries		Vector	
S_234	FGDL	NCDC	Florida	Historic Hurricane Paths		Vector	
S_235	FGDL	BAR	Florida	Historic Structure Locations		Vector	
S_236	FGDL	NOAA	Florida	Historical North Atlantic Tropical Cyclones		Vector	
S_237	FGDL	USGS	Florida_Coast	Hydrography Subset - From USGS 1:100,000 DLG Hydrography		Vector	
S_238	FGDL	FDEP	Florida	Hydrologic Cataloging Units of Florida		Vector	
S_239	FGDL	BIA	Florida	Indian Reservation lands		Vector	
S_240	FGDL	UF	Florida	Landsat TM Imagery Index		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_241	FGDL	FHA	Florida	Large Urban Boundaries		Vector	
S_242	FGDL	USGS	Florida	Major Dams of the State of Florida		Vector	
S_243	FGDL	NRCS	Florida	Major Land Resources Areas		Vector	
S_244	FGDL	FDEP	Florida	Major Rivers of Florida - lines		Vector	
S_245	FGDL	FDEP	Florida	Major Rivers of Florida - polygons		Vector	
S_246	FGDL	FDOT	Florida	Major Roads - Statewide		Vector	
S_247	FGDL	NOAA	Florida_Coast	Marine Plastic Pollutions Research and Control Act Boundaries		Vector	
S_248	FGDL	FMRI	Florida	Military Lands		Vector	
S_249	FGDL	USGS	Florida	Mineral and Metal Operations		Vector	
S_250	FGDL	NOAA	Florida_Coast	Mineral Management Planning Area Boundaries		Vector	
S_251	FGDL	NOAA	Florida_Coast	Mineral management Service Active Lease Sites		Vector	
S_252	FGDL	NCDC	Florida	National Climate Data Center Annual Precipitation Stations		Vector	
S_253	FGDL	BTS	Florida	National Highway Planning Network 2001		Vector	
S_254	FGDL	USGS	Florida	National Hydrography Dataset - Lines - Statewide		Vector	
S_255	FGDL	USGS	Florida	National Hydrography Dataset - Waterbodies - Statewide		Vector	
S_256	FGDL	USGS	Florida	National Hydrology Dataset Landmark - Lines		Vector	
S_257	FGDL	USGS	Florida	National Hydrology Dataset Landmark - Points		Vector	
S_258	FGDL	NOAA	Florida_Coast	National Marine Sanctuary Areas		Vector	
S_259	FGDL	FDEP	Florida_Coast	National Oceanic and Atmospheric Administration Obstacles		Vector	
S_260	FGDL	NOAA	Florida	National Parks and Seashores		Vector	
S_261	FGDL	NOAA	Florida	National Pollutant Discharge Elimination System		Vector	
S_262	FGDL	BAR	Florida	National Register of Historic Places		Vector	
S_263	FGDL	BTS	Florida	Navigable Waterways		Vector	
S_264	FGDL	USGS	Florida	Nitrogen Fertilizer Sales Estimates		Vector	
S_265	FGDL	NOAA	Florida_Coast	NOAA Approved Coastal Zones		Vector	
S_266	FGDL	SWFRPC	Florida	North Florida Future Land Use		Vector	
S_267	FGDL	NWFWMD	Florida	Northwest Florida Water Management District Owned Lands		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_268	FGDL	USGS	Florida	Nuclear Site Locations		Vector	
S_269	FGDL	EPA	Florida	Nutrient Sampling Sites		Vector	
S_270	FGDL	NOAA	Florida_Coast	Ocean Dredged Material Disposal Sites		Vector	
S_271	FGDL	Varied	Florida	Off Road Vehicle Recreation Trails 2002		Vector	
S_272	FGDL	FMRI	Florida_Coast	Offshore Oil and Gas Drilling Platforms		Vector	
S_273	FGDL	NOAA	Florida_Coast	Outer Continental Shelf Lease Block Grid		Vector	
S_274	FGDL	FDEP	Florida	Outstanding Florida Waters		Vector	
S_275	FGDL	FDEP	Florida	Physiographic Provinces		Vector	
S_276	FGDL	SJRWMD	Florida	Physiographic Regions - lines		Vector	
S_277	FGDL	SJRWMD	Florida	Physiographic Regions - polygons		Vector	
S_278	FGDL	USGS	Florida	Powerplant Locations		Vector	
S_279	FGDL	USGS	Florida	Principle Aquifers of the State of Florida		Vector	
S_280	FGDL	Varied	Florida	Proposed Recreational Trails 2003		Vector	
S_281	FGDL	FREAC/WMDs	Florida	Public Land Survey System - Section Level		Vector	
S_282	FGDL	USGS	Florida	Public Land Survey System - Township and Range Level		Vector	
S_283	FGDL	FDEP	Florida	Quarter Quads Index		Vector	
S_284	FGDL	USGS	Florida	Radon Protection		Vector	
S_285	FGDL	BTS	Florida	Rail Road 100k	1:100,000	Vector	
S_286	FGDL	FDOT	Florida	Railway Lines		Vector	
S_287	FGDL	SWFWMD	Florida	Recharge Areas of the Floridan Aquifer		Vector	
S_288	FGDL	FDEP	Florida	Regional Planning Council Boundaries		Vector	
S_289	FGDL	FCC	Florida	Registered Cellular Antenna Structure Locations		Vector	
S_290	FGDL	FCC	Florida	Registered Television Broadcast Structure Locations		Vector	
S_291	FGDL	FCC	Florida	Registered Wireless Antenna Structure Locations		Vector	
S_292	FGDL	BAR	Florida	Resource Groups		Vector	
S_293	FGDL	FDOT	Florida	River Flood Gauges		Vector	
S_294	FGDL	NOAA	Florida	Rivers Digital Geography		Vector	
S_295	FGDL	NOAA	Florida	Sand Resources		Vector	
S_296	FGDL	FMRI	Florida_Coast	Seagrass Beds Along Coastline		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_297	FGDL	FDOT	Florida_Coast	Sewage Tanks in the Florida Keys		Vector	
S_298	FGDL	FDEP	Florida	Sewage Treatment Facilities		Vector	
S_299	FGDL	FDOT	Florida_Coast	Sewage Treatment Plants in the Florida Keys		Vector	
S_300	FGDL	UF	Florida	Shaded Relief Surface		Vector	
S_301	FGDL	UF	Florida	Short Trails and Overlooks		Vector	
S_302	FGDL	Private	Florida	Sinkholes of Florida		Vector	
S_303	FGDL	FDEP	Florida	Solid Waste Facilities		Vector	
S_304	FGDL	SFWMD	Florida	South Florida Water Management District Lands		Vector	
S_305	FGDL	SWFRPC	Florida	South Florida Future Land Use		Vector	
S_306	FGDL	SWFRPC	Florida	Southwest Florida Exiting Storm Surge		Vector	
S_307	FGDL	SWFWMD	Florida	Southwest Florida Water Management District Owned Lands		Vector	
S_308	FGDL	NOAA	Florida_Coast	Spatial Extent of Florida National Estuary Program		Vector	
S_309	FGDL	NOAA	Florida_Coast	Spatial Extent of the Coastal Barrier Resource System		Vector	
S_310	FGDL	FDEP	Florida	Special Outstanding Florida Waters		Vector	
S_311	FGDL	SJRWMD	Florida	St. Johns River Water Management District Lands		Vector	
S_312	FGDL	SJRWMD	Florida	St. John's Springs		Vector	
S_313	FGDL	USFWS	Florida_Coast	Statewide Saltmarsh Locations		Vector	
S_314	FGDL	FMRI	Florida_Coast	Statewide Tidal Flats		Vector	
S_315	FGDL	FFWCC	Florida	Strategic Habitat Conservation Areas 2000		Vector	
S_316	FGDL	NOAA	Florida_Coast	Submerged Lands Act		Vector	
S_317	FGDL	EPA	Florida	Superfund Hazardous Waste Sites		Vector	
S_318	FGDL	NOAA	Florida	Superfund/National Priority List Site Boundaries		Vector	
S_319	FGDL	FDEP	Florida	Surface Water Classification		Vector	
S_320	FGDL	FDEP	Florida	Surficial Geology		Vector	
S_321	FGDL	SRWMD	Florida	Suwannee River Water Management District Owned Lands		Vector	
S_322	FGDL	SWFWMD	Florida	SW Florida Water Management District Watershed Boundaries		Vector	
S_323	FGDL	NOAA	Florida_Coast	Territorial Sea Boundary		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_324	FGDL	NOAA	Florida_Coast	Tide Stations		Vector	
S_325	FGDL	FNAI	Florida	TNC Ecological Resource Conservation Areas		Vector	
S_326	FGDL	EPA	Florida	Trace Element Sampling Sites		Vector	
S_327	FGDL	USCB	Florida	Traffic Analysis Zones 2000		Vector	
S_328	FGDL	USGS	Florida	USDA 1997 Census		Vector	
S_329	FGDL	NOAA	Florida	USACE Civil Works D		Vector	
S_330	FGDL	USGS	Florida	USACE Dam Locations		Vector	
S_331	FGDL	USCB	Florida	US Census Block Groups 2000		Vector	
S_332	FGDL	USGS	Florida	US Census Bureau Agricultural Expenses by Count		Vector	
S_333	FGDL	USGS	Florida	US Census Bureau Agricultural Expenses by County		Vector	
S_334	FGDL	USGS	Florida	US Census Bureau Agricultural Livestock Holding		Vector	
S_335	FGDL	USCB	Florida	US Cents Bureau Census Block Groups 1990		Vector	
S_336	FGDL	USCB	Florida	US Census Counties 2000		Vector	
S_337	FGDL	USCB	Florida	US Census Tracts 2000		Vector	
S_338	FGDL	FMRI	Florida_Coast	US Coast Guard Aids to Navigation		Vector	
S_339	FGDL	EPA	Florida	USEPA National Priority Sites From CERCLIS		Vector	
S_340	FGDL	EPA	Florida	USEPA Permitted Dam Locations		Vector	
S_341	FGDL	EPA	Florida	USEPA Regulated Facilities Locations		Vector	
S_342	FGDL	USGS	Florida	USGS 1:100,000 DRGs		raster	
S_343	FGDL	USGS/FDEP	Florida	USGS 1:100,000 Quad Sheet Index		Vector	
S_344	FGDL	USGS/FDEP	Florida	USGS 1:24,000 Quad Sheet Index		Vector	
S_345	FGDL	USGS	Florida	USGS 1:250,000 DEM grid		raster	
S_346	FGDL	USGS/FDEP	Florida	USGS 1:250,000 Quad Sheet Index		Vector	
S_347	FGDL	USGS	Florida	USGS Realtime Stream Gauging Stations		Vector	
S_348	FGDL	USGS	Florida	USGS Survey Control Markers		Vector	
S_349	FGDL	UF	Florida	Vegetative Communities 1967		Vector	
S_350	FGDL	FDEP	Florida	Water Management District Boundaries		Vector	
S_351	FGDL	FDEP	Florida	Water Monitoring Section Reporting Units		Vector	
S_352	FGDL	FDEP	Florida	Water Treatment Facilities		Vector	
S_353	FGDL	FDEP	Florida	Watersheds with Elevated Phosphorus		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_354	USGS		Florida	Cultural Landmarks - Lines	1:1,000,000	Vector	
S_355	USGS		Florida	Cultural Landmarks - Points	1:1,000,000	Vector	
S_356	USGS		Florida	Political/Ocean - Network	1:1,000,000	Vector	
S_357	USGS		Florida	Populated Places - Points	1:1,000,000	Vector	
S_358	USGS		Florida	Populated Places - Polygons	1:1,000,000	Vector	
S_359	USGS		Florida	State Soil Geographic - STATSGO		Vector	
S_360	USGS		Florida	Utility - Lines		Vector	
S_361	USGS		Florida	Vegetation - Polygons		Vector	
S_362	USGS	FDOT	Florida	24K County Boundaries - Line		Vector	
S_363	USGS	FDOT	Florida	24K County Boundaries - Polygon		Vector	
S_364	USGS	FDEP	Florida	Cities		Vector	
S_365	USGS		Florida	Department of Transportation District Boundaries - Line		Vector	
S_366	USGS		Florida	Department of Transportation District Boundaries - Polygon		Vector	
S_367	USGS	FDEP	Florida	FDEP District Boundaries - Line		Vector	
S_368	USGS	FDEP	Florida	FDEP District Boundaries - Polygon		Vector	
S_369	USGS	FDEP	Florida	FDEP District Boundaries Pre1997		Vector	
S_370	USGS	FDEP	Florida	FDEP Quad Grid		Vector	
S_371	USGS	FDEP	Florida	Latitude/Longitude Grid		Vector	
S_372	USGS	FDEP	Florida	Parks		Vector	
S_373	USGS	FDEP	Florida	Private Lands		Vector	
S_374	USGS	FDEP	Florida	Regional Planning Councils		Vector	
S_375	USGS	FDEP	Florida	Solid Waste Facilities		Vector	
S_376	USGS	FDOT	Florida	State Boundary Line		Vector	
S_377	USGS	FDOT	Florida	State Boundary Polygon		Vector	
S_378	USGS	FDEP	Florida	TIGER Counties		Vector	
S_379	USGS	FDEP	Florida	TIGER County 100K	1:100,000	Vector	
S_380	USGS	FDEP	Florida	TIGER Tract		Vector	
S_381	USGS	FDOT	Florida	Urban Boundaries Line		Vector	
S_382	USGS	FDOT	Florida	Urban Boundaries Polygon		Vector	
S_383	USGS	FDEP	Florida	Ambient Air sites		Vector	
S_384	USGS	FDEP	Florida	Ecoregions		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_385	USGS	FDEP	Florida	Ecosystem Management Areas		Vector	
S_386	USGS	FDEP	Florida	Mitigation Banks		Vector	
S_387	USGS	FDEP	Florida	100K USGS Florida Lakes	1:100,000	Vector	
S_388	USGS	FDEP	Florida	HUC Basins		Vector	
S_389	USGS	FDEP	Florida	Special Outstanding Florida Waters		Vector	
S_390	USGS	FDEP	Florida	Surface Water Class Boundaries		Vector	
S_391	USGS	FDEP	Florida	Water Management Boundaries 100K	1:100,000	Vector	
S_392	USGS		Florida	Drainage - Network		Vector	
S_393	USGS		Florida	Drainage - Points		Vector	
S_394	USGS		Florida	Drainage Supplement - Points		Vector	
S_395	USGS		Florida	Ocean Features - Lines		Vector	
S_396	USGS		Florida	Hypsography - Network		Vector	
S_397	USGS		Florida	Hypsography - Points		Vector	
S_398	USGS		Florida	Hypsography Supplemental - Lines		Vector	
S_399	USGS		Florida	Hypsography Supplemental - Points		Vector	
S_400	USGS		Florida	Land Cover - Points		Vector	
S_401	USGS		Florida	Land Cover - Polygons		Vector	
S_402	USGS	FDOT	Florida	Airport Boundaries		Vector	
S_403	USGS	FDEP	Florida	Interstates		Vector	
S_404	USGS	FDOT	Florida	Ports		Vector	
S_405	USGS	FDOT	Florida	State Roads		Vector	
S_406	USGS	FDEP	Florida	Trials		Vector	
S_407	USGS	FDEP	Florida	US Highways		Vector	
S_408	USGS	FDEP	Florida	US Highways 100K	1:100,000	Vector	
S_409	USGS		Florida	Aeronautical - Points		Vector	
S_410	USGS		Florida	Railroads - Lines		Vector	
S_411	USGS		Florida	Roads - Lines		Vector	
S_412	USGS		Florida	Transportation Structure -Lines		Vector	
S_413	FDEP		Florida	303(d) 1998 Impaired Waters		Vector	
S_414	FDEP		Florida	303(d) 2002 Group 1 Impaired Waters		Vector	
S_415	FDEP		Florida	305(b) 1996 Water Quality Data		Vector	

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ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_416	FDEP		Florida	305(b) 1998 Water Quality Data		Vector	
S_417	FDEP		Florida	305(b) 2000 STORET Stations		Vector	
S_418	FDEP		Florida	305(b) 2000 Water Quality Data		Vector	
S_419	FDEP		Florida	Alabama Counties with shoreline		Vector	
S_420	FDEP		Florida	Alabama Shoreline		Vector	
S_421	FDEP		Florida	Ambient Air Monitoring Sites		Vector	
S_422	FDEP		Florida	Aquatic Preserves (polygons)		Vector	
S_423	FDEP		Florida	Aquatic Preserves (lines)		Vector	
S_424	FDEP		Florida	Artificial Reefs		Vector	
S_425	FDEP		Florida	Bathymetry (polygons)		Vector	
S_426	FDEP		Florida	Bathymetry (lines)		Vector	
S_427	FDEP		Florida	Brownfield Area Centroids		Vector	
S_428	FDEP		Florida	Brownfield Area Polygons		Vector	
S_429	FDEP		Florida	Brownfield Sites with Executed BSRAs (polygons)		Vector	
S_430	FDEP		Florida	Brownfield Sites with Executed BSRAs (points)		Vector	
S_431	FDEP		Florida	Canalworks		Vector	
S_432	FDEP		Florida	Cities		Vector	
S_433	FDEP		Florida	City Limits		Vector	
S_434	FDEP		Florida	DEP and WMD Offices		Vector	
S_435	FDEP		Florida	DRASTIC for the Floridan Aquifer		Vector	
S_436	FDEP		Florida	DRASTIC for the Intermediate Aquifer		Vector	
S_437	FDEP		Florida	DRASTIC for the Surficial Aquifer		Vector	
S_438	FDEP		Florida	Drainage Basins 1995 (polygons)		Vector	
S_439	FDEP		Florida	Drainage Basins 1995 (lines)		Vector	
S_440	FDEP		Florida	Drainage Basins 1997 (polygons)		Vector	
S_441	FDEP		Florida	Drainage Basins 1997 (lines)		Vector	
S_442	FDEP		Florida	EcoRegions/SubRegions		Vector	
S_443	FDEP		Florida	Ecosystem Management Areas		Vector	
S_444	FDEP	FDEP	Florida	FDEP Regulatory Districts (polygons)		Vector	
S_445	FDEP	FDEP	Florida	FDEP Regulatory Districts (lines)		Vector	
S_446	FDEP	FEMA	Florida	FEMA Flood Zones		Vector	

Statewide_FL

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_447	FDEP		Florida	FWCC Management Areas		Vector	
S_448	FDEP		Florida	FWCC Region Boundaries		Vector	
S_449	FDEP		Florida	Florida Counties with Shoreline (polygons)		Vector	
S_450	FDEP		Florida	Florida Counties with Shoreline (lines)		Vector	
S_451	FDEP		Florida	Front Porch Communities		Vector	
S_452	FDEP		Florida	Future Land Use (North)		Vector	
S_453	FDEP		Florida	Future Land Use (South)		Vector	
S_454	FDEP		Florida	Geology (Environmental)		Vector	
S_455	FDEP		Florida	Geology (Stratigraphy)		Vector	
S_456	FDEP		Florida	Georgia Counties with Shoreline (polygons)		Vector	
S_457	FDEP		Florida	Georgia Shoreline		Vector	
S_458	FDEP		Florida	Ground Water Contamination Areas		Vector	
S_459	FDEP		Florida	Hydrologic Unit Code (HUC) Basins (polygons)		Vector	
S_460	FDEP		Florida	Hydrologic Unit Code (HUC) Basins (lines)		Vector	
S_461	FDEP		Florida	Integrated Habitat Network		Vector	
S_462	FDEP		Florida	Interstates		Vector	
S_463	FDEP		Florida	Lakes (polygons)		Vector	
S_464	FDEP		Florida	Lakes (points)		Vector	
S_465	FDEP		Florida	Landsat TM Imagery Index		Vector	
S_466	FDEP		Florida	Latitude/Longitude Grid Index		Vector	
S_467	FDEP		Florida	Major Geographic Features from GNIS		Vector	
S_468	FDEP		Florida	Major Rivers (polygons)		Vector	
S_469	FDEP		Florida	Major Rivers (lines)		Vector	
S_470	FDEP		Florida	Manatee Protection Zones		Vector	
S_471	FDEP		Florida	Mandatory Phosphate Mines		Vector	
S_472	FDEP		Florida	Marinas		Vector	
S_473	FDEP		Florida	Marine Terraces		Vector	
S_474	FDEP		Florida	Miscellaneous Transportation Lines		Vector	
S_475	FDEP		Florida	Mitigation Bank Service Areas		Vector	
S_476	FDEP		Florida	Mitigation Banks		Vector	
S_477	FDEP	NOAA	Florida	NOAA Chart Index 40K	1:40,000	Vector	
S_478	FDEP	NOAA	Florida	NOAA Chart Index 80K	1:80,000	Vector	

Statewide_FL

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_479	FDEP	NOAA	Florida	NOAA Chart Index (large scale)		Vector	
S_480	FDEP		Florida	NWFWMD 1995 Land Use		Vector	
S_481	FDEP		Florida	National Wetlands Inventory (polygons)		Vector	
S_482	FDEP		Florida	National Wetlands Inventory (lines)		Vector	
S_483	FDEP		Florida	Outstanding Florida Waters		Vector	
S_484	FDEP		Florida	Park Boundaries		Vector	
S_485	FDEP		Florida	Pesticide DRASTIC for the Floridan Aquifer		Vector	
S_486	FDEP		Florida	Pesticide DRASTIC for the Intermediate Aquifer		Vector	
S_487	FDEP		Florida	Pesticide DRASTIC for the Surficial Aquifer		Vector	
S_488	FDEP		Florida	Phosphorous Restrictive Basins		Vector	
S_489	FDEP		Florida	Physiographic Provinces		Vector	
S_490	FDEP		Florida	Populated Place Names		Vector	
S_491	FDEP		Florida	Projections and Datums		Vector	
S_492	FDEP		Florida	Public Land Survey System 100K	1:100,000	Vector	
S_493	FDEP		Florida	Public Land Survey System 24K	1:24,000	Vector	
S_494	FDEP		Florida	Quad Grid Index 100K	1:100,000	Vector	
S_495	FDEP		Florida	Quad Grid Index 24K	1:24,000	Vector	
S_496	FDEP		Florida	Quad Grid Index 250K	1:250,000	Vector	
S_497	FDEP		Florida	Quarter Quad Grid Index		Vector	
S_498	FDEP		Florida	Railways 100K	1:100,000	Vector	
S_499	FDEP		Florida	Recreational Trails		Vector	
S_500	FDEP		Florida	Regional Planning Councils		Vector	
S_501	FDEP		Florida	SFWMD 1998 Land Use		Vector	
S_502	FDEP		Florida	SFWMD 1995 Land Use		Vector	
S_503	FDEP		Florida	SJRWMD 1998 Land Use		Vector	
S_504	FDEP		Florida	SJRWMD 1995 Land Use		Vector	
S_505	FDEP		Florida	SJRWMD 2000 Land Use		Vector	
S_506	FDEP		Florida	SRWMD 1998 Land Use		Vector	
S_507	FDEP		Florida	SRWMD 1995 Land Use		Vector	
S_508	FDEP	NRCS	Florida	SSURGO Soils (SFWMD)		Vector	
S_509	FDEP	NRCS	Florida	SSURGO Soils (SJRWMD)		Vector	
S_510	FDEP	NRCS	Florida	SSURGO Soils (SRWMD)		Vector	

Statewide_FL

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_511	FDEP	NRCS	Florida	SSURGO Soils (SWFWMD)		Vector	
S_512	FDEP	NRCS	Florida	STATSGO Soils		Vector	
S_513	FDEP		Florida	SWFWMD 1998 Land Use		Vector	
S_514	FDEP		Florida	SWFWMD 1995 Land Use		Vector	
S_515	FDEP		Florida	SWFWMD 1999 Land Use		Vector	
S_516	FDEP		Florida	Sea Grasses		Vector	
S_517	FDEP		Florida	Sinkhole Types		Vector	
S_518	FDEP		Florida	Sinkholes		Vector	
S_519	FDEP		Florida	Southeast Region (polygons)		Vector	
S_520	FDEP		Florida	Southeast Region (lines)		Vector	
S_521	FDEP		Florida	Springs (1st Magnitude 2000)		Vector	
S_522	FDEP		Florida	State Boundary		Vector	
S_523	FDEP		Florida	State Lands Parcels from FTSLI (large)		Vector	
S_524	FDEP		Florida	State Lands Parcels from FTSLI (small)		Vector	
S_525	FDEP		Florida	Statewide 1974 Land Use 250K	1:250,000	Vector	
S_526	FDEP		Florida	Surface Water Class Boundaries (polygons)		Vector	
S_527	FDEP		Florida	Surface Water Class Boundaries (lines)		Vector	
S_528	FDEP		Florida	TIGER 1990 Block Groups		Vector	
S_529	FDEP		Florida	TIGER 1990 Blocks		Vector	
S_530	FDEP		Florida	TIGER 1990 Counties		Vector	
S_531	FDEP		Florida	TIGER 1990 Tracts		Vector	
S_532	FDEP		Florida	TIGER 2000 Block Groups		Vector	
S_533	FDEP		Florida	TIGER 2000 Blocks		Vector	
S_534	FDEP		Florida	TIGER 2000 Counties		Vector	
S_535	FDEP		Florida	TIGER 2000 Tracts		Vector	
S_536	FDEP		Florida	TIGER Roads 1999		Vector	
S_537	FDEP		Florida	TIGER Roads 2000		Vector	
S_538	FDEP		Florida	US States		Vector	
S_539	FDEP	USGS	Florida	USGS Boundaries (24K/polygons)	1:24,000	Vector	
S_540	FDEP	USGS	Florida	USGS Boundaries (24K/lines)	1:24,000	Vector	
S_541	FDEP	USGS	Florida	USGS Boundaries (2M)	1:2,000,000	Vector	
S_542	FDEP	USGS	Florida	USGS Gauging Stations		Vector	

Statewide_FL

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_543	FDEP	USGS	Florida	USGS Hydrography (24K/polygons)	1:24,000	Vector	
S_544	FDEP	USGS	Florida	USGS Hydrography (24K/lines)	1:24,000	Vector	
S_545	FDEP	USGS	Florida	USGS Hydrography (2M/polygons)	1:2,000,000	Vector	
S_546	FDEP	USGS	Florida	USGS Hydrography (2M/lines)	1:2,000,000	Vector	
S_547	FDEP	USGS	Florida	USGS Railroads 25K	1:25,000	Vector	
S_548	FDEP	USGS	Florida	USGS Roads 24K	1:24,000	Vector	
S_549	FDEP	USGS	Florida	Vegetative Communities 1967		Vector	
S_550	FDEP		Florida	WMS Tier 1 Status Network Reporting Units		Vector	
S_551	FDEP		Florida	Water Bodies		Vector	
S_552	FDEP		Florida	Water Lines		Vector	
S_553	FDEP		Florida	Water Management Districts (polygons)		Vector	
S_554	FDEP		Florida	Water Management Districts (lines)		Vector	
S_555	FDEP		Florida	Water Supply Restoration (WSRP) Wells		Vector	
S_556	FDEP		Florida	Wetlands		Vector	

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_1	TNRIS		Nationwide	USA Boundary			
N_2	TGLO	NPS, WRD	Nationwide	National Parks	1:24,000	Vector	
N_3	USGS	USGS	Nationwide	Geology of the US			
Data below found at: http://mrdata.usgs.gov/sddpftp.html							
N_4	USGS	USGS	Nationwide	Igneous rocks PLUTO		Vector	
N_5	USGS	USGS	Nationwide	NURE Sediment Chemistry		Raster	
N_6	USGS	USGS	Nationwide	Soil Chemistry		Vector	
N_7	USGS	USGS	Nationwide	Soils PLUTO		Vector	
N_8	USGS	USGS	Nationwide	Soils RASS		Vector	
N_9	USGS	USGS	Nationwide	Unconsolidated Sediments PLUTO		Vector	
N_10	USGS	USGS	Nationwide	Unconsolidated Sediments RASS		Vector	
N_11	USGS	USGS	Nationwide	US Geology	1:2,500,000	Raster	1000 m
N_12	USGS	USGS	Nationwide	US Geology [Geologic Faults]	1:2,500,000	Raster	1000 m
N_13	USGS	USGS	Nationwide	US Aeromagnetics		Raster	1000 m
N_14	USGS	USGS	Nationwide	US Bouguer Gravity Field		Raster	4 km
N_15	USGS	USGS	Nationwide	US Isostatic Gravity Field		Raster	4 km
N_16	USGS	USGS	Nationwide	US Magnetics NW Illumination		Raster	2 km
N_17	USGS	USGS	Nationwide	Active Mines and Mineral Plants		Vector	
N_18	USGS	USGS	Nationwide	Mineral Availability System		Vector	
N_19	USGS	USGS	Nationwide	Mineral Resource Data		Vector	
N_20	USGS	USGS	Nationwide	Cities	1:2,000,000	Vector	
N_21	USGS	USGS	Nationwide	Counties		Vector	
N_22	USGS	USGS	Nationwide	Elevated Shaded Relief		Raster	2km
N_23	USGS	USGS	Nationwide	Federal Lands	1:2,000,000	Vector	
N_24	USGS	USGS	Nationwide	Hydrologic Units	1:250,000 and 1:100,000	Vector	
N_25	USGS	USGS	Nationwide	Hydrology	1:2,000,000	Vector	
N_26	USGS	USGS	Nationwide	Land Cover		Raster	1000 m
N_27	USGS	USGS	Nationwide	Railroads	1:100,000	Vector	
N_28	USGS	USGS	Nationwide	Roads	1:3,000,000	Vector	
N_29	USGS	USGS	Nationwide	Urban Areas		Vector	
N_30	USGS	USGS	Nationwide	USA	1:25,000,000	Vector	
N_31	USGS	USGS	Nationwide	24000 Quadrangle Boundaries		Vector	

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_32	USGS	USGS	Nationwide	250000 Quadrangle LU/LC	1:250,000	Vector	
Data below found at: www.epa.gov/mrlc/data.html (a site with helpful links to spatial and non-spatial data, nationwide)							
N_33	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2002 Road			
N_34	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2002 Railroad			
N_35	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2002 hydrography			
N_36	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2000 water			
N_37	NRCS/USDA	NRCS/USDA	Nationwide	FEMAQ3 Flood Data	1:24,000		
N_38	NRCS/USDA	NRCS/USDA	Nationwide	8-digit hydrologic units	1:250,000		
N_39	NRCS/USDA	NRCS/USDA	Nationwide	DRG County Mosaic by NRCS			
N_40	NRCS/USDA	NRCS/USDA	Nationwide	DRG	1:24,000		
N_41	NRCS/USDA	NRCS/USDA	Nationwide	DRG	1:100,000		
N_42	NRCS/USDA	NRCS/USDA	Nationwide	DRG	1:250,000		
N_43	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1:24,000 map index			
N_44	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1:100,000 map index			
N_45	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1:250,000 map index			
N_46	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1 degree by state map index			
N_47	NRCS/USDA	NRCS/USDA	Nationwide	National Elevation Dataset			
N_48	NRCS/USDA	NRCS/USDA	Nationwide	DEM			
N_49	NRCS/USDA	NRCS/USDA	Nationwide	DOQ County Mosaic by APFO			
N_50	NRCS/USDA	NRCS/USDA	Nationwide	ErMapper Ortho Mosaic by NRCS			
N_51	NRCS/USDA	NRCS/USDA	Nationwide	National Land Cover Dataset by State			
N_52	NRCS/USDA	NRCS/USDA	Nationwide	Soil Survey Geographic (SSURGO) data base			
N_53	NRCS/USDA	NRCS/USDA	Nationwide	Annual Average Precipitation by state			
N_54	NRCS/USDA	NRCS/USDA	Nationwide	Monthly Average Precipitation by state			
N_55	USGS	ESRI	Nationwide	United States			
Data below found at: http://nationalatlas.gov/atlasftp.html							
N_56	NationalAtlas	USDA/NRCS	Nationwide	Average Annual Precipitation	1:2,000,000	vector	
N_57	NationalAtlas	USGS	Nationwide	Breeding Bird Survey Routes	1:2,000,000	vector	
N_58	NationalAtlas	USGS	Nationwide	County Boundaries	1:2,000,000	vector	
N_59	NationalAtlas	USACE	Nationwide	Dams	1:2,000,000	vector	
N_60	NationalAtlas	USFS	Nationwide	Ecoregions	1:2,000,000	vector	
N_61	NationalAtlas	USFS/USGS	Nationwide	Forest Cover Types	1:2,000,000	raster	

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_62	NationalAtlas	USGS	Nationwide	Forest Fragmentation Classification	1:2,000,000	raster	
N_63	NationalAtlas	USEPA/USGS	Nationwide	Forest Fragmentation Causes	1:2,000,000	raster	1 km
N_64	NationalAtlas	USEPA	Nationwide	Forest Fragmentation Causes	1:2,000,000	raster	540 m
N_65	NationalAtlas	USEPA	Nationwide	Forest Fragmentation Causes	1:2,000,000	raster	270 m
N_66	NationalAtlas	USGS	Nationwide	Generalized Geologic Map	1:2,000,000	vector	
N_67	NationalAtlas	USGS	Nationwide	Hydrologic Unit Boundaries	1:2,000,000	vector	
N_68	NationalAtlas	USGS	Nationwide	Invasive Species_Zebra Mussels	1:2,000,000	vector	
N_69	NationalAtlas	USGS	Nationwide	Land Cover Characteristics	1:2,000,000	raster	
N_70	NationalAtlas	USGS	Nationwide	Land Cover Diversity	1:2,000,000	raster	
N_71	NationalAtlas	USGS	Nationwide	Mineral Operations_Agriculture	1:2,000,000	vector	
N_72	NationalAtlas	USGS	Nationwide	Mineral Operations_Construction	1:2,000,000	vector	
N_73	NationalAtlas	USGS	Nationwide	Mineral Operations_Ferrous Metal Mines	1:2,000,000	vector	
N_74	NationalAtlas	USGS	Nationwide	Mineral Operations_Ferrous Metals Processing Plants	1:2,000,000	vector	
N_75	NationalAtlas	USGS	Nationwide	Mineral Operations_Miscellaneous Industrial	1:2,000,000	vector	
N_76	NationalAtlas	USGS	Nationwide	Mineral Operations_Nonferrous Metal Mines	1:2,000,000	vector	
N_77	NationalAtlas	USGS	Nationwide	Mineral Operations_Nonferrous Metal Processing Plants	1:2,000,000	vector	
N_78	NationalAtlas	USGS	Nationwide	Mineral Operations_Refractory, Abrasive, and other Industrial	1:2,000,000	vector	
N_79	NationalAtlas	USGS	Nationwide	Mineral Operations_Sand and Gravel	1:2,000,000	vector	
N_80	NationalAtlas	USGS	Nationwide	Mineral Operations_Stone, Crushed	1:2,000,000	vector	
N_81	NationalAtlas	USGS	Nationwide	NAWQA Surface-Water Sampling Sites	1:2,000,000	vector	
N_82	NationalAtlas	USGS	Nationwide	North American Bat Ranges	1:2,000,000	vector	
N_83	NationalAtlas	USGS	Nationwide	Parkways and Scenic Rivers	1:2,000,000	vector	
N_84	NationalAtlas	USGS	Nationwide	Principal Aquifers	1:2,000,000	vector	
N_85	NationalAtlas	USGS	Nationwide	Public Land Survey	1:2,000,000	vector	
N_86	NationalAtlas	USGS	Nationwide	Railroads	1:2,000,000	vector	
N_87	NationalAtlas	USGS	Nationwide	Realtime Streamflow Stations	1:2,000,000	vector	
N_88	NationalAtlas	USGS	Nationwide	Roads	1:2,000,000	vector	
N_89	NationalAtlas	USGS	Nationwide	Shaded Relief of North America	1:2,000,000	raster	
N_90	NationalAtlas	USGS	Nationwide	States	1:2,000,000	vector	
N_91	NationalAtlas	USGS	Nationwide	Streams and Waterbodies	1:2,000,000	vector	
N_92	NationalAtlas	USGS	Nationwide	Wilderness Areas	1:2,000,000	vector	
N_93	NationalAtlas	USGS	Nationwide	Amphibian Distributions			

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_94	NationalAtlas	USGS	Nationwide	Butterflies			
N_95	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Chinese Privet			
N_96	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Tallowtree			
N_97	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Common Gorse			
N_98	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Leafy Spurge			
N_99	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Purple Loosestrife			
N_100	NationalAtlas	USGS	Nationwide	Moths			
N_101	NationalAtlas	CDC	Nationwide	West Niles Virus_Human Cases			
N_102	NationalAtlas	CDC	Nationwide	West Niles Virus_Mosquito Surveillance			
N_103	NationalAtlas	CDC	Nationwide	West Niles Virus_Sentinel Flock Surveillance			
N_104	NationalAtlas	CDC	Nationwide	West Niles Virus_Veterinary Cases			
N_105	NationalAtlas	CDC	Nationwide	West Niles Virus_Wild Bird Cases			
N_106	NationalAtlas	CDC	Nationwide	West Niles Virus_Human Cases			
N_107	NationalAtlas	CDC	Nationwide	West Niles Virus_Mosquito Surveillance			
N_108	NationalAtlas	CDC	Nationwide	West Niles Virus_Sentinel Flock Surveillance			
N_109	NationalAtlas	CDC	Nationwide	West Niles Virus_Veterinary Cases			
N_110	NationalAtlas	CDC	Nationwide	West Niles Virus_Wild Bird Cases			
N_111	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Frequency Data			
N_112	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Botulism			
N_113	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Cholera			
N_114	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Lead Poisoning			
N_115	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_OP/CARB Poisoning			

Databases

ID	Database	Query info down to… park	county	state	other	Who
D_1	Amphibian Counts Database	?	?	?	?	USGS
D_2	ARMI	no	no	no	no	USGS
D_3	BEST_Biological and Ecotoxicological Characteristics of Terrestrial Vertebrate Species Residing in Estuaries	no	no	no	Gulf Coast	USGS
D_4	BEST_CEE-TV	no	no	yes	HUC, City, Species	USGS
D_5	BEST_Species Decline	no	no	no	Gulf Coast	USGS
D_6	Breeding Bird Census	?	?	?	?	USGS
D_7	Breeding Bird Survey	no	no	yes	route	USGS
D_8	Butterflies of North America	no	yes	yes		USGS
D_9	Chinese Privet	no	yes	yes		NRCS/USDA
D_10	Christmas Bird Count	?	no	yes	count	Audubon
D_11	Christmas Bird Count	no	no	no	count	USGS
D_12	eBird	yes	yes	yes	any location	
D_13	Envirofacts_Air Realeases (AIRS/AFS)		yes	yes	EPA region	EPA
D_14	Envirofacts_Environmental Radiation Ambient Monitoring System (ERAMS)		yes	yes	EPA region	EPA
D_15	Envirofacts_Multisystem Query		yes	yes	EPA region	EPA
D_16	Envirofacts_National Contaminant Occurrence Database (NCOD)		yes	yes	EPA region	EPA
D_17	Envirofacts_Toxic Release Inventory (TRI)		yes	yes	EPA region	EPA
D_18	Envirofacts_UV index		yes	yes	EPA region	EPA
D_19	Envirofacts_Water Discharge Permits (PCS)		yes	yes	EPA region	EPA
D_20	Inventory and Monitoring on National Parks	yes				NPS
D_21	MAPS	no	no	yes	region, station	USGS
D_22	Mid-Winter Waterfowl Survey	no	no	yes	flyway, species, year	USFWS
D_23	Migratory Bird Data Center					USFWS/USGS
D_24	NAAMP	no	no	no	route	USGS
D_25	NARCAM	no	yes	no		USGS
D_26	National Atlas of the US					
D_27	NatureServe Explorer	no	no	yes	plant/animal, status	NatureServe
D_28	NBII			yes	lat/long coordinates	USGS
D_29	NBII Bird Conservation node					USGS
D_30	Nonindigenous Aquatic Species (NAS)	no	no	yes	HUCs (2 and 6)	USGS
D_31	NWIS Web Site	no	yes	yes	HUC, Sampling Site	USGS
D_32	PLANTS Database	no	no	yes		NRCS/USDA

Databases

ID	Database	Query info down to… park	county	state	other	Who
D_33	Project Feeder Watch	no	no	yes		Cornell Lab of Ornithology
D_34	Waterbird Monitoring Patnership	no	no	no	site_ID	USGS
D_35	Waterfowl Breeding Population and Habitat Survey	no	no	?	species, year, strata	USFWS

NatureBib Maps

NBIB_ID	Author	Year	Title
3289	<No Author>	1986	1986 Wetland Habitats on Horn Island, Mississippi
62006	<No Author>	1980	Horn Island - Reference Line Survey
42869	<No Author>	1977	Exhibit "A" Wilderness Plan: Gulf Islands National Seashore
83286	<No Author>	1991	Naval Live Oaks Area, Gulf Islands National Seashore
5422	<No Author>	1992	Aerial Composite Photograph Map of Perdido Key, FL
18769	Baskerville Donovan Engineers, Inc.,	1978	Boundary Survey of a Parcel in T-2-S, R-23-W for Gulf Islands National Seashore
18767	Baskerville Donovan Engineers, Inc.,	1980	Boundary Survey: Naval Live Oaks Area - Gulf Islands National Seashore
91323	Bouman, Lane J.		Petit Bois Island
61987	Bouman, Lane J.		Horn Island
99129	Brannon, D.	1978	Proposed Marsh Point Boundary Adjustment, Davis Bayou Area, Gulf Islands National Seashore
90585	Defense Mapping Agency Topographic Center,	1974	Pensacola, Florida
51174	Department Of The Interior - National Park Service,	1996	Ft Pickens High Tides
92957	Driver, E.C.	1996	Plan and Profile Maps of Ft Pickens Road
133288	Eleuterius, Lionel N.	1979	Vegetational Map of Horn Island, Mississippi
133289	Eleuterius, Lionel N.	1979	Vegetational Map of Petit Bois Island, Mississippi
90583	Escambia County - Office Of County Appraiser,		Pensacola Beach
90580	Florida Department Of Environmental Protection - Florida Marine Research Institute,	1996	Pensacola Bay/Big Lagoon Boater's Guide
51175	Gulf Islands National Seashore,	1996	Ft Pickens Maintenance Facilities (Proposed)
58897	Gulf Islands National Seashore - Division Of Resource Management,	1995	Gulf Islands National Seashore, Santa Rosa Subsection
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Abbreviations	Definition	website
BAR	Florida Division of Historical Resources, Bureau of Archaeological Research	
BIA	Bureau of Indian Affairs	
BTS	US Dept of Transportation (USDOT), Bureau of Transportation Statistics	
CIR	Color Infra-Red	
CTG	Composite Theme Grid	
DEM	Digital Elevation Model	
DEQ	Department of Environmental Quality	
DLG	Digital Line Graph	
DOQQ	Digital Ortho Quarter Quadrangle	
DRG	Digital Raster Graphics	
EMAP	Environmental Monitoring and Assessment Program	
EOSAT	Space Imaging Earth Observation Satellite Company	
EPA	Environmental Protection Agency	
FAA	Federal Aviation Administration	
FCC	Federal Communications Commission	
FCFWRU	Florida Cooperative Fish and Wildlife Research Unit	
FDEM	Florida Division of Emergency Management	
FDEP	Florida Department of Environmental Protection	http://www.dep.state.fl.us/gis/datadir.asp
FDOT	Florida Department of Transportation	
FEMA	Federal Emergency Management Agency	
FFWCC	Florida Fish and Wildlife Conservation Commission	
FGDL	Florida Geographic Data Library	http://www.fgdl.org/
FMRI	Florida Marine Research Institute	
FNAI	Florida Natural Areas Inventory	
FREAC	Florida Resources and Environmental Analysis Center	
GAP	Gap Analysis Program	http://www.gap.uidaho.edu/
GIRAS	Geographic Information Retrieval and Analysis System	
GRS	Geographic Reference System	
LAA	Landscape Analysis and Assessment	http://www.srs.fs.usda.gov/4803/landscapes/index.html

Abbreviations	Definition	website
LIDAR	Light Detection and Ranging	http://www.csc.noaa.gov/cgi-bin/crs/tcm/ldart_start.pl
LP DAAC	Land Processes Distributed Active Archive Center	
LULC	Land Use/Land Cover	
MARIS	Mississippi Automated Resource Information System	http://www.maris.state.ms.us/HTM/about.htm
MODIS	Moderate Resolution Imagery Spectroradiometer	
MSBCI	MS Band of Choctaw Indians	
MSDECD	MS Department of Economic and Community Development	
MSDH	MS Department of Health	
MSDOT	MS Department of Transportation	
MSDWFP	MS Department of Wildlife, Fisheries, and Parks	
MSEMA	MS Emergency Management Agency	
MSFC	MS Forestry Commission	
MSIHL	Mississippi Institution of Higher Learning	
MSMRI	MS Mineral Resources Institute	
MSPUS	MS Public Utility Staff	
MSTM	Mississippi Transverse Mercator	
MSU	Mississippi State University	
NCDC	National Climatic Data Center	
NED	National Elevation Dataset	
NGS	National Geodetic Survey	
NHD	National Hydrography Dataset	http://nhd.usgs.gov/data.html
NLCD	National Landcover Data	http://www.epa.gov/mrlc/nlcd.html and http://landcover.usgs.gov/natllandcover.asp
NOAA	National Oceanic and Atmospheric Administration	
NOAA/CSC	National Oceanic and Atmospheric Administration/Coastal Services Center	http://www.csc.noaa.gov/cgi-bin/crs/tcm/ldart_start.pl
NRCS	USDA, Natural Resources Conservation Service	
NWFWMD	Northwest Florida Water Management District	
OEDR	Office of Economic and Demographic Research	
SCS	Soil Conservation Service	
SDTS	Spatial Data Transfer Standard	http://data.geocomm.com/sdts/
SFWMD	South Florida Water Management District	
SJWMD	St. John's Water Management District	
SPCS	State Plane Coordinate System	
SRTM	Shuttle Radar Topography Mission	

Abbreviations	Definition	website
SRWMD	Suwannee River Water Management District	
SSURGO	Soil Survey Geographic Database	http://www.ncgc.nrcs.usda.gov/branch/ssb/products/SSURGO/index.html
STATSGO	State Soil Geographic Database	http://www.ncgc.nrcs.usda.gov/branch/ssb/products/statsgo/index.html
SWFRPC	Southwest Florida Regional Planning Council	
SWFWMD	Southwest Florida Management Water District	
TNVA	Tennessee Valley Authority	
UF	University of Florida GeoPlan Center	
UMS	University of Mississippi	
USACE	US Army Corps of Engineers	
USBOC	US Bureau of Census	
USCB	US Census Bureau	
USDA	US Department of Agriculture	
USEPA	US Environmental Protection Agency	http://www.epa.gov/mrlc/data.html
USFS	United States Forest Service	http://www.srs.fs.usda.gov/4803/landscapes/index.html
USFWS	United States Fish and Wildlife Service	
USGS	United States Geological Survey	http://mapping.usgs.gov/products.html#digital_data http://data.geocomm.com/
USGS **The National Map**	The National Map	http://seamless.usgs.gov/viewer.htm
WMDs	All Five Water Management Districts	